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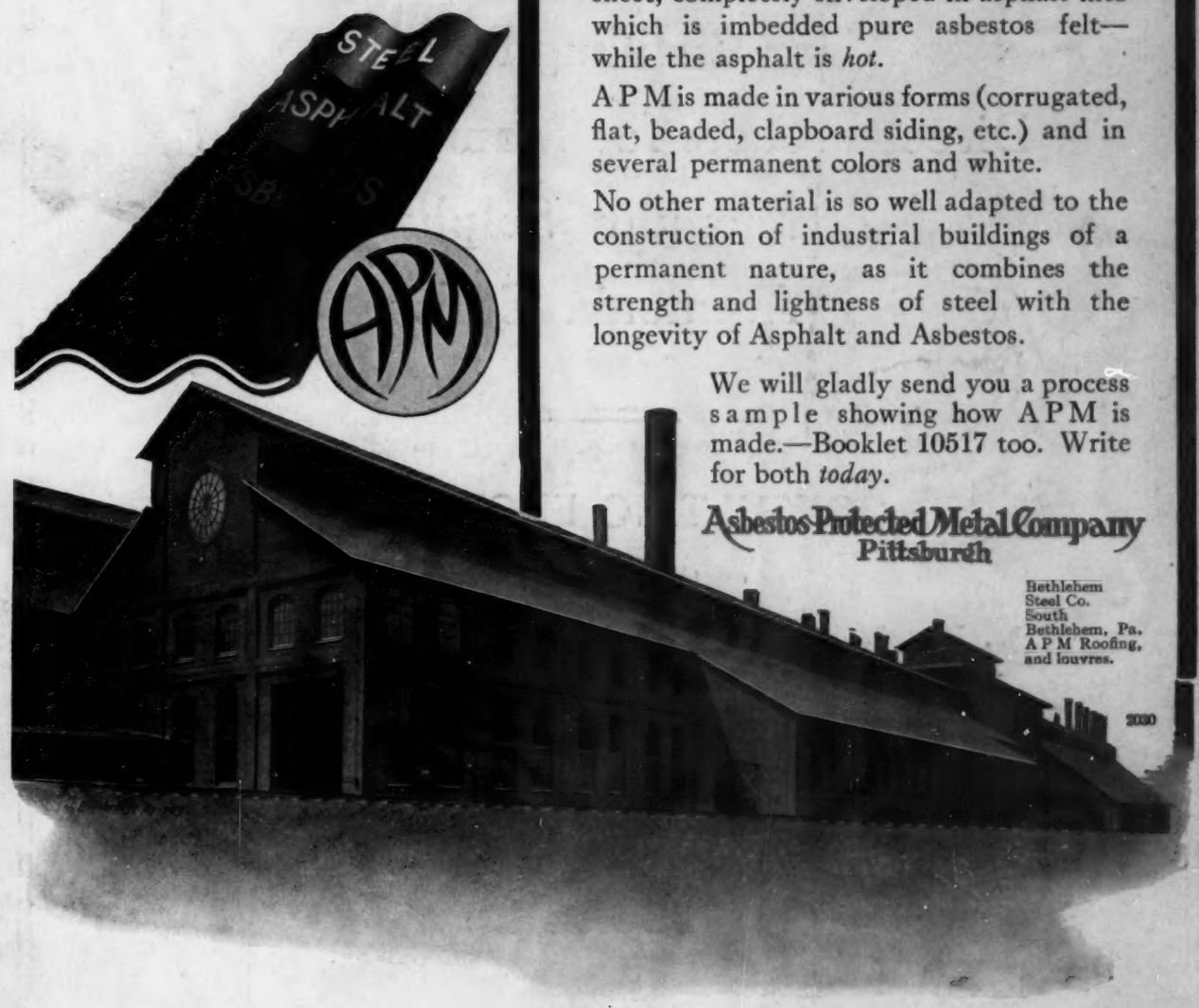

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Alphabetical list of Advertisers, page 152. | Table of Contents, page 43. | "Where-to-Buy," page 106.
Opportunities, pages 146-147. | Second-Hand Machinery, pages 148-149. | Fill-in and Contract Work, page 151.
Manufacturing Sites, page 150 | Engineering Directory, page 138

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THE IRON TRADE REVIEW

Vol. LVIII Cleveland, June 8, 1916 No. 23

Buyers Growing Shy of High Prices

Orders Are Light for Domestic and Foreign Account, Excepting Special Commodities Such as Plates—Pig Iron Production Smashes All Previous Records

CONTINUED high prices have converted the thoroughfares of trade into trails of uncertainty and the steel market, as far as new buying is concerned, has dropped back into low gear. Except in the case of certain special commodities, buying is in evidence only when backed by actual necessity. Consumers are shy of high prices. Eastern fabricators are ordering very little steel for stock purposes, and in cases where reserves accumulated at low prices have been depleted, they are not making new commitments without specific protection from mills. In the west, agricultural implement makers have been invited to reserve tonnage for 1917 delivery at 2.50c, Pittsburgh, base, for bars, but this figure is considered too high. It is pointed out that the retail purchasers of implements will not pay the higher quotations necessitated by $50 steel. The back-lash of high prices is curtailing buying in other directions, and many manufacturers who dispose of their product through retail channels are caught between two fires, inasmuch as the ultimate consumer cannot readily be led to accept the higher figures that would naturally result from the tremendous advance in rolled steel quotations. Options on shell steel for 1916 were allowed to expire in the east on June 1. This material, therefore, either will be purchased in the open market or not at all.

Active Lines

In some lines, however, the rush of buying remains unabated. Plates are a notable example. Both the domestic and foreign inquiry for ship plates leaves nothing to be desired. British interests are in the market for from 15,000 to 20,000 tons for October delivery. The plate market remains at 3.75c to 4c, Pittsburgh, for shipment this year. Owing to the unprecedented demand for gasoline, oil country goods are exceedingly active and prices on sizes over 2 inches in diameter have been advanced $4 to $5 a ton. Heavy inquiries for munition steel and wire are pending. An eastern Pennsylvania manufacturer has a new order for approximately 50,000 12-inch shell forgings, which will require 15,000 tons of steel.

Pig Iron

Were it not for heavy foreign inquiries in the east, the pig iron market would present an unusually drab aspect. Various European interests are seeking heavy tonnages and this inquiry aggregates 50,000 tons. The domestic pig iron market, both in the east and west, is unprecedentedly quiet. The Maryland Steel Co. is believed to have taken an additional 10,000 tons of basic for last half shipment at $18, furnace, representing a price shrinkage of $1 a ton. Birmingham and Cincinnati advices indicate that southern manufacturers have become reconciled to the lull and sales of No. 2 foundry have been made at $14.50, Birmingham, for prompt shipment and $14.65 for delivery extending to Dec. 31. W. P. Snyder & Co. report the average sale price of bessemer pig iron for May at $20.883, valley. This represents an increase of $0.133 over April. The average price for basic during May was $18.1607, an increase of 16 cents over the April figure.

Semi-Finished Steel

The semi-finished steel market presents a mixed aspect. Billets are said to be stronger in Youngstown, where buyers cannot cover at $43, mill, and weaker at Pittsburgh, where sales down to $40 are reported. The eastern Pennsylvania market is flooded with crop ends and discards from shell billets.

Pig Iron Production

May pig iron production broke all previous records, with a daily average of 108,514 tons and a total output of 3,363,926 tons. There are now 321 active stacks and more furnaces are blowing than at any time since September, 1907. The output of steelmaking iron in May was 2,451,646 tons, and the merchant furnaces produced 872,340 tons. Ferro production in May was 21,384 tons.

THE OPEN HEARTH

Throwing Millions in the Air

ANOTHER astounding exhibition of a lack of common sense and a blind obsession by an idea is furnished by congress in inserting in the army reorganization bill, now in the hands of President Wilson, a section appropriating $20,000,000 for the building of a government nitrate plant. If such a thing were possible, this proposed expenditure is even more objectionable than the plan to spend $11,000,000 in building an armor plate plant. If the proposed nitrate plant should be built, it would furnish another example of needless duplication by the government of production now being carried on by private enterprises in a better and more efficient manner than would be possible under federal management.

The by-product coke industry of the country, now undergoing such rapid development, is producing sulphate of ammonia at the estimated rate of 230,000 tons annually, and with the works now under construction this will be increased to 430,000 tons. Hence this essential raw material for nitric acid production is available for the government's purposes in an amount that will more than meet any possible requirements. The upbuilding of the by-product coke industry, is of great importance to the cultivation of varied lines of manufacture in this country, on account of the great value of the by-products which are wasted by the bee-hive process of manufacturing coke and recovered by the by-product process, and on account of the tremendous military value of some of the by-products in the manufacture of high explosives.

There are the strongest reasons for the government aiding the by-product industry in every reasonable way, but section 124 of the bill which has just passed specifically provides "that the plant or plants provided for under this act shall be constructed and operated solely by the government and not in conjunction with any other industry or enterprise carried on by private capital." In other words, it will not be possible to conduct the proposed plant in connection with any by-product coking concern owned by private capital. This is one of the rankest kinds of government destructiveness.

Owing to the many highly important provisions of the bill other than section 124, the President has already signed the document. The one good feature of it is that the section does not make it mandatory upon the President to establish a nitrate plant. He is merely authorized and empowered to make or cause to be made such investigation as in his judgment is necessary to determine the best means for the production of nitrates and other products for munitions of war and useful in the manufacture of fertilizers and other useful products by water power or any other power, as in his judgment is the best and cheapest to use. He is further authorized to construct a water power plant, or other means than water power, for the production of nitrates. It is within the power of the President to sign the bill and do absolutely nothing. This, we believe, is what he will do, if he listens to the advice of men who are thoroughly informed on the subject, are opposed to government interference with business when it is not demanded by the interests of the people of the country, and are able and anxious to render patriotic service by putting their plants and products at the command of the government.

The New Directory

IN HIS admirable address before the American Iron and Steel Institute last Friday, Hon. Edward N. Hurley spoke of the institute as the "greatest association in the greatest industry in the world," but only those who have considerable knowledge of the iron business and have had experience in compiling statistics in regard to it can appreciate the immensity of the undertaking of publishing a directory of iron and steel works of the country. Many have, however, by constant use through many years of the directories issued by the late James M. Swank, come to realize the important service which these directories have rendered, and to all such persons the announcement of the publication of the eighteenth edition of the directory will be received with much satisfaction. Eight years is a long period in the history of the iron and steel business of the United States, and since 1908, when the last directory was issued by Mr. Swank, so many changes have taken place and so many additions made to manufacturing capacity that the old directory, even with the two supplements issued in 1910 and 1912, was of very litle use.

In November, 1873, the first edition of the directory was published, and in all seventeen editions and two supplements appeared under the editorship of Mr. Swank. The publication of these directories constituted a large part of what Mr. Carnegie described as the unpayable debt which the iron trade owed to James M. Swank. The work required great industry, accuracy and sound judgment. The cost in money was large and as much as $20,000 was expended on one edition.

Naturally, in planning the directory, in the early days the industry of the country was treated according to geographical districts. For example, Pennsylvania was divided into Philadelphia city and county, the Lehigh valley, the Schuylkill val-

THE OPEN HEARTH

ley, the eastern Pennsylvania district, the upper Susquehanna valley, the lower Susquehanna valley, the Juniata valley, Pittsburgh and Allegheny county, Shenango valley and Beaver county and the western Pennsylvania district. This plan was based largely on the fuels and local ores used and is still adhered to to a large extent by some old fashioned compilers of blast furnace statistics, but the reason for its existence disappeared years ago and it is pleasing to know that in the new directory it has been entirely abandoned. In the new volume, the names of all companies, firms and individuals engaged in the manufacture of pig iron, steel, hot rolled products, charcoal blooms, tin plates and terne plates are given in alphabetical order regardless of location and can easily be found without the aid of an index. It contains only 437 pages, as compared with 500 pages in the directory of 1908, and in order to compress the information, a large number of abbreviations have been adopted. These abbreviations are, however, very simple and the user of the book will soon become familiar with them. Although all that is claimed is that the edition is corrected to Jan. 1, 1916, as late an event as the acquiring of a controling interest in the Cambria Steel Co. by the Midvale Steel & Ordnance Co. in February, 1916, is recorded.

On the whole, the directory is a very creditable continuation of the admirable work of Mr. Swank and reflects much credit upon Howard H. Cook, assistant secretary of the institute, William G. Gray, the head of its statistical bureau and other members of the institute staff.

The Tariff Commission Bill

THE Rainey bill, as finally reported to the national house, has been endorsed by the tariff commission league and it is probable that with some amendments it will be passed before congress adjourns. It is extremely difficult to frame a bill of this kind which will meet the views of even a majority of those who are most deeply interested in the passage of just tariff measures, and doubtless many propositions to amend will be submitted. We trust, however, that opposition to certain features of the bill will not be carried so far as to endanger its passage.

Owing to the unsatisfactory results obtained from the present tariff law, and to the extraordinary conditions due to the European war, it is highly important that a tariff commission be created and put to work as soon as possible. The Rainey bill contains numerous admirable features and at least makes a start in the right direction. If the newly created commission should not do its work satisfactorily, the next president of the United States and the new congress could soon change the personnel or amend the law.

Judge Gary, in his speech before the American Iron and Steel Institute, outlined very clearly the work that the commission might be expected to do. Probably some day a commission will be given full power to act regardless of party lines, but the country is not yet ready for so radical a departure, and the party in power must dictate what the tariff shall be.

Now is the Time to Standardize

THE standardization of machine tools is not a new idea and although its merits are thoroughly appreciated by both manufacturers and users, very little progress has been made up to the present time. This has been due largely to differences of opinion among machine tool builders and to the natural fear of each individual manufacturer that he would lose valuable competitive advantages in the melting pot. The machine tool industry, however, is now confronted with new and powerful reasons for standardization which it is hoped will break down such opposition to the idea as still exists. Briefly, if the industrial preparedness program is to fully accomplish its object, it is necessary that such machine tools as lathes, milling machines, profiling machines, etc., be standardized.

It has recently been pointed out that in spite of the activities of the past 18 months, this country has no where near enough machine tools within its borders to meet the requirements of a first class war. In case of a struggle, it would be necessary for us to bend all our energies to the production of more machine tools and in addition to import large quantities from such foreign sources as we would be able to command. The advantages of standardized parts in such an emergency are almost self evident. If the major elements of machine tool construction were standardized and interchangeable, the problem of mass production would be greatly simplified. Factories could concentrate on the manufacture of only those parts which could be turned out most advantageously, while other shops could turn their entire energies to assembling. Certain parts could be made abroad to standard specifications and others, such as heavy castings, could be produced here. In short, a leaf could be taken from the experience of the automobile industry and the favorable results that eventually would flow to the machine tool business from such a procedure can scarcely be estimated in dollars and cents.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products June 7, average for May, 1916, average for March, 1916, and average for June, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices June 7, 1916.	Aver. for May, 1916.	Average for Mch., 1916.	Aver. for June, 1915.
Bessemer pig iron, Pittsburgh	$21.95	$21.95	$21.55	$14.58
Basic pig iron, Pittsburgh	18.95	18.95	19.20	13.54
No. 2 Fdy. pig iron, Pittsburgh	19.45	19.325	19.45	13.45
Northern No. 2 Fdy., Chgo	19.00	19.00	18.70	13.00
Lake Superior Charcoal, Chgo.	19.75	19.75	19.75	15.25
Mall. Bess., Chgo	19.50	19.50	19.20	13.00
Southern No. 2, Birmingham	14.75	14.95	15.25	9.57
Southern Ohio No. 2, Ironton	18.25	18.46	18.00	12.50
Basic, eastern Pa	19.50	20.00	20.00	13.50
No. 2X Virginia furnace	18.50	18.00	18.25	12.50
No. 2X foundry, Philadelphia	20.50	20.50	20.25	14.25
Ferro mang., Balti., (1917)	175.00	175.00	150.00	105.00
Bessemer billets, Pbgh	42.00	44.25	40.60	19.87
Bess. sheet bars, Pbgh	42.00	44.25	41.00	20.37
Op.-h'th sh. bars, Pbgh	42.00	44.25	41.00	20.37
Open-hearth billets, Pbgh	42.00	44.25	40.60	19.87
Steel bars, Chgo	3.10	3.00	2.50	1.39
Steel bars, Pittsburgh, contr	2.50	2.50	2.34	1.20
Iron bars, Philadelphia	2.559	2.559	2.559	1.20
Iron bars, Cleveland, local del'y.	2.40	2.40	2.40	1.15
Iron bars, Chgo. mill	$2.35	2.35	2.19	1.15
Beams, Chgo.	3.10	3.00	2.50	1.39
Beams, Pittsburgh, contr	2.50	2.50	2.40	1.20
Beams, Philadelphia	2.659	2.659	2.409	1.30
Tank plates, Pbgh., contract	2.90	2.75	2.50	1.15
Tank plates, Chicago	3.50	3.30	2.67	1.31
Tank plates, Philadelphia	3.909	3.909	3.409	1.30
Sheets, blk., No. 28, Pbgh	3.00	2.925	2.75	1.80
Sheets, blue an., No. 10, Pbgh.	3.00	3.025	2.87	1.35
Sh., galv., No. 28, Pbgh	4.85	4.88	4.82	4.46
Wire nails, Pittsburgh	2.50	2.50	2.38	1.55
Connellsville fur. coke, contr	2.50	2.60	2.80	1.65
Connellsville fdy. coke, contr	3.50	3.50	3.90	2.25
Heavy melting steel, Pbgh	16.50	17.12	17.95	11.75
Heavy melting steel, east'n Pa.	16.50	16.75	17.00	11.50
Heavy melting steel, Chgo	15.75	16.50	16.20	9.37
No. 1 wrought eastern Pa	21.75	22.50	22.50	12.75
No. 1 wrought, Chgo	15.25	16.37	16.15	8.75
Rerolling rails, Chgo	16.50	17.25	17.20	10.00
Car wheels, Chgo	12.50	13.10	14.05	9.87

(For Additional Prices See Page 1296.)

Foreign Buyers Bolster Pig Iron

Overseas Inquiry Pending in Metropolitan District Totals 50,000 Tons—Domestic Markets Are All Very Quiet

New York, June 6.—Foreign business in pig iron is monopolizing most of the attention of sellers and producers, as buying by domestic users in this district has flattened out. A total inquiry for not less than 50,000 tons of miscellaneous grades for export delivery is pending and there have been some good-sized sales. The Italian State Railways, which have been inquiring for about 15,000 tons of bessemer for shipment this year, have closed, but it is not certain whether this is the same order taken by a Cleveland seller, as reported last week. This buyer also has taken 1,000 tons of foundry from Pennsylvania makers. These orders are for delivery at seaboard. The Bolinders Co., Stockholm, engine builders, is inquiring for 1,500 tons of foundry; other export lots include 10,000 tons of malleable for Italy, 10,000 tons of basic for either Russia or Italy, 2,000 tons for France, and various other lots. The ocean freight market remains very irregular. There has been a sharp cut to the United Kingdom and northern France, as low as $11 a ton, on billets, having been quoted, but southern France and Italy are strong and shippers find difficulty to get $30 per ton, to the Mediterranean from southern ports. Only small sales are being made to consumers in this district. A buyer at New Jersey tidewater placed 1,000 tons of prompt low silicon Buffalo iron at $19, furnace. Prices, generally, reflect softness, and $20.25 to $20.50, delivered this territory, for No. 2X, has been done on small quantities for this year's shipment.

No Buying at Chicago

Chicago, June 6.—Practically entire absence of inquiry continues in the Chicago market for pig iron, including both northern and southern grades. Some small tonnages are being bought to fill in for immediate use, but most buyers are well covered for last half and the situation does not tempt them to seek contracts for first half of 1917. One important factor, which is reducing the amount of iron melted in foundries, is inability to obtain sufficient labor, both molders and unskilled workers. Foundries have heavy business on their books and many are forced to turn away orders which they could accept if their forces could be increased to operate at capacity. Some slight labor troubles are also restricting operations in a few foundries, which adds to the situation.

Most makers of pig iron in this territory have booked by far the larger part of their production during the present year and are willing to let the situation stand without being anxious to press the market or offer inducements to foundrymen to buy further. Prices remain steady at $19, furnace, for No. 2 foundry and $19.50 for malleable and no sign of concession from this level has been noted.

Most makers of southern iron are holding at $15, Birmingham, for prompt and second half delivery, but it is believed $14.50, Birmingham, could be done for any reasonable delivery, while some furnaces are asking $15.50 for last half. Quotations as high as $16, Birmingham, have been made on iron for first half of 1917. With lack of interest on the part of buyers, most sellers are not crowding the market and present weakness is attributed to the presence of resale iron.

Quiet at Philadelphia

Philadelphia, June 5.—So quiet a market in pig iron has not been experienced in some months in this territory, as during the past week. The only new business of importance was the further buying of basic iron by the Maryland Steel Co. from eastern Pennsylvania furnaces. Another lot of 10,000 tons for last half shipment was placed late last week with a Schuylkill valley steel maker at a reported price of $19.25, delivered,

(*For complete prices see page* 1296.)

which if this was the exact figure means on the supposition that the iron is to be shipped to Sparrows Point, a price of about $18, furnace, which is more than $1 under any recent transaction in eastern Pennsylvania basic.

It still is a question, however, how this iron finally will be distributed and some of it eventually may go to the Bethlehem Steel Co., at South Bethlehem, Pa., or to other points nearer the shipping furnaces. The Maryland Steel Co. now has purchased something like 20,000 to 25,000 tons in its own name and it is reported the Bethlehem Steel Co. also has been a buyer. It appears quite conclusively that no Alabama basic figured in the Maryland Steel Co. purchases and that eastern Pennsylvania metal, as stated in last week's report, will be furnished. Part of the eastern Pennsylvania basic now absorbed by these purchases, has been pressing the market for several weeks seeking a buyer. Foundry and other grades of iron absolutely are devoid of interest. Prices still show a slight movement toward softness. Eastern Pennsylvania No. 2X can be had at $19.50 to $19.75, furnace or $20.25 to $20.75, Philadelphia, and central Pennsylvania brands at $19, furnace, both for this year. Virginia makers have declined to quote $18.50 for No. 2X for last quarter for which they want $19. They are doing $18.50 for last half. The Lenoir City, Tenn., car works has closed with southern makers against its last half inquiry for 1,650 tons of coke foundry and charcoal. The Keystone furnace of the Reading Iron Co. has resumed after several months idleness.

Pig Iron Quiet at Pittsburgh

Pittsburgh, June 6.—Except for pending negotiations for bessemer pig iron for export, the general pig iron market reflects no signs of activity in western Pennsylvania and eastern Ohio. Specifications against contracts are heavy, but no new buying of importance is noted, and no inquiries involving large tonnages are before the trade. England, France and Italy are negotiating for fairly large tonnages of bessemer iron, but no contracts for foreign shipment have been placed recently in the Greater Pittsburgh district.

According to compilations by W. P. Snyder & Co., prices of steel making pig iron advanced in May. The actual selling average for bessemer pig iron last month was $20.833, valley, or 13.3 cents above the figure established in April. Sales of basic iron in May averaged $18.1607, valley, as against $18, in April. Forty thousand tons of each grade were involved in transactions entering into sales price compilations. Averages are based upon sales of 1,000 tons or more by blast furnaces in the Mahoning and Shenango valleys. Of interest to the iron trade, is the announcement that the Cambria Steel Co., Johnstown, Pa., yesterday applied the torch to a new blast furnace 85 days after construction work started.

Prices Firm at Buffalo

Buffalo, June 6.—The price situation in the Buffalo market has assumed an absolute rigidity in the face of an absence of very much buying or inquiry. This is due, it is said, to the conviction of the producers that a full demand for all the iron that the stacks of this district are capable of turning out is sure to come. One of the major producing interests of the Buffalo district has withdrawn from the market completely for the remainder of the year.

Cleveland Market Quiet

Cleveland, June 6. — Pig iron is quoted at $19, Cleveland furnace, for the balance of the year and it is believed that this price will be maintained. The market is stationary and is displaying considerable strength. An inquiry for 10,000 tons of bessemer for prompt shipment to a foreign buyer is current, but has found no local dealers who are interested. Cleveland interests are well sold up for the balance of the year and very little additional tonnage has been disposed of recently. Several sales for next year have been concluded, but no figures are available.

Pig Iron Dull at St. Louis

St. Louis, June 6.—Because of the fact that prices of southern iron are low, with a tendency toward a still more pronounced downward movement, trading has been very light for the last 10 days, and prospects for improved business conditions are none too bright. Southern iron is offered at $15, Birmingham, for any delivery over the remainder of the year or the first half of next year. Northern iron is quite firm at $19, Chicago, for No. 2, and $19.50 for malleable, but there have been few transactions recently.

Southern Iron Lower

Cincinnati, June 6.—Low prices continue to rule the southern market. Small lots of No. 2 foundry resale iron have been sold for prompt delivery at $14.50, Birmingham basis, and several sales of this grade have been made for the last half of this year at $14.65, Birmingham basis. The ruling price for first quarter of next year is $15, but it is known that a few small lots have been disposed of at $14.85, Birmingham basis, for No. 2 foundry. Southern Ohio resale iron is being offered at various prices.

Limited tonnages can be purchased at $18, Ironton basis, for No. 2 foundry, but the majority of dealers are asking from $18.25 to $18.50 for spot delivery and the third quarter of this year. Furnace iron is being held at $19 Ironton basis. Silvery iron is selling all the way from $26 to $29, furnace, for 8 per cent silicon.

At receiver's sale on June 5, the two furnaces of the Wellston Steel & Iron Co., Wellston, O., were sold for $294,000. The Wellston stack was purchased by S. E. Steinberger, of Jackson, O., for $210,000, and the Milton stack was taken by H. S. Willard Sr., of Wellston, O., for $84,000. The purchasers were both bond holders of the company. Efforts will be made to put both furnaces in blast in the near future.

Prices Would Be Shaded

Birmingham, Ala., June 5.—Birmingham iron manufacturers are not beating the devil around the stump. They see that price levels of the past several months are weak. They realize that consumers are in no hurry to cover for last half. Business is light in volume. The manufacturers, therefore, admit that proffers of large tonnages would be accepted at shaded prices, especially in the case of forward iron. One well-posted maker said: "It is a $15 market for spot and for last half of the year with the same price obtaining for 1917 delivery in case of lap-over order". Another maker said: "The market is weak. I regard $15 as the price for spot and the rest of the year with $15.50 the basis for 1917". Meanwhile 1,000 tons were sold during the week for last quarter and 1917 delivery at $15.50. Other forward sales of comparatively small lots brought $15.50, but this price did not follow effort at bargaining. The desirable consumer can obtain concessions. Several furnace interests have lots of 1916 make of iron yet to dispose of. Resale metal is going under $15, spot and forward, but there is only a small quantity of warrants on Alabama yards not owned by consumers. Some more basic has been sold on close figures. As a general proposition it may be said that $15 is the rule for Birmingham iron, either spot or forward, with some resale metal going under this figure and some forward over $15 and as high as $15.50.

(*For complete prices see page* 1296.)

Crop Ends Flood Market

Eastern Makers Have Sold Short Length Bessemer Billets Under $40, Mill

Philadelphia, June 5. — Offers of crop ends and discards from shell billets continue to flood the market. Makers find it much more difficult to make sales and are obliged to grant sharp price concessions. The market's softness is due to the large tonnage that presented itself from all sources after the brief period of trading activity some weeks ago when up to $55 mill was obtained for this material. Now it is questionable whether $40 mill can be obtained. Some short length bessemer billets were sold here the past week under $40, Ohio mill. Eastern Pennsylvania makers of billets for the market, report a brisk inquiry now current, much of which is for export. The prices and sizes offered have been very attractive and negotiations now are proceeding. Some further domestic tonnages for fourth quarter specification have been sold at $50, mill, for re-rolling and $65, mill base, for forging billets.

Strong in Youngstown

Youngstown, O., June 6.—Despite the absence of sales, the market for semi-finished materials is strong. Prices have stiffened and the softness apparent a week or 10 days ago has disappeared. This softness was largely ascribable to interests other than the regular producing mills. These mills have been well sold up for months, and their strong position was indicated yesterday when a buyer made unsuccessful attempts to cover for a round tonnage at $43. Another factor, local mills point out, that occasionally causes sales below the accepted market price, is the temporary suspension of shipping orders. This has occurred principally in the case of plants making munitions, where strikes or delays in reaching capacity operations have prevented rapid handling of incoming steel shipments. In these instances, which have occurred in some mills in the surrounding districts, the embargoed steel has been offered at concessions, and some has been taken by consumers in the Youngstown district.

Sheet mills have not covered for last quarter shipments of sheet bars. It is understood that the steelmakers are holding their steel at $42.50 for bessemer, and higher for open hearth. At present sheet prices, the consuming mills hesitate to contract ahead. One sale of open hearth sheet bars was made to a sheet mill in this district this week at $40, mill, the tonnage involved being small. It is a peculiar reflection of present abnormal conditions that large tonnages of semi-finished, as well as some finished, lines attract higher prices than small lots. The explanation for this anomaly is found in the sold-up condition of the mills. Small lots, thrown on the market through a combination of circumstances, will be disposed of at concessions for immediate sale, while large buyers pay higher prices.

Semi-Finished More Freely Offered

Pittsburgh, June 6.—The situation for semi-finished steel products is not nearly so acute as it was early this year. Fairly heavy tonnages of billets have found their way to the open market, and some manufacturers have been able to accumulate surplus tonnages of sheet bars. Prices of both products are lower than they have been for many weeks, although most makers continue to ask $45, mill, and above. Scattering lots of billets have been sold at as low as $40, mill, during the last two weeks. No trace of sales the last few days at less than $42, mill, can be found, and it generally is believed that $45, mill, soon will represent the minimum price of billets and sheet bars.

Coke is Spotty

Market is Uncertain in North and Strong in South

Cincinnati, June 6.—Prices on coke are uncertain, because transactions are at a standstill. Sales of furnace coke made last month were low, and foundries bought only a small tonnage. The latter, however, covered for their yearly requirements during the month of April. Furnace operators state that present prices of coke are too high and they will not go out for requirements until reasonable reductions are made. Wise county and Pocahontas furnace coke are quoted from $3 to $3.25, ovens. and New River furnace grades from $3.25 to $3.50, ovens, all for contract shipment.

Italy Wants Coke

New York, June 6.—Italy now is a prospective buyer of foundry coke in this country and has an inquiry for 3,000 tons before the trade. An inquiry for a cargo of smelter's coke, 3,000 to 5,000 tons for South America also is pending. The American Locomotive Co. is inquiring for 9,500 tons of foundry coke for its various plants for last half delivery.

(*For complete prices see page* 1296.)

Coke Gains Ground

Pittsburgh, June 6.—Heavy demand for Connellsville coal for shipment to consumers affected by labor troubles at bituminous mines along the Monongahela river, has tended to strengthen the market for blast furnace and cupola coke. A number of Connellsville coke operators last week curtailed operations in order to ship coal at rather fancy prices. Blast furnace fuel for prompt delivery is being held at from $2.75 to $2.90, ovens, by more important dealers. Seventy-two hour coke is being quoted at $3.50, ovens, but the absence of sales makes it difficult to determine the position of prices.

A number of blast furnace interests have opened tentative negotiations for coke requirements for the second half of this year. Operators, who willingly accepted sliding scale contracts for fuel for shipment the first half of 1916, now are insisting upon flat prices, apparently because of the uncertainty of the future. So far as can be ascertained, no contracts have been placed recently for the delivery of blast furnace fuel after July 1 next. The *Connellsville Courier* for the week ending May 27, says production of coke in the Connellsville regions was 436,812 tons, compared with 434,441 tons the week previous.

Coke Quiet in St. Louis

St. Louis, June 6.—Coke is lifeless, with Connellsville and Virginia foundry grades ranging around $3.25, ovens. There is very little trading.

Southern Coke Exported

Birmingham, Ala., June 5.—Coke is very strong owing to the absence of competition in the southwest, California and other territory, from which shipments of foreign and West Virginia cokes have been diverted by the engagement of vessels in other directions. There seems no end to the period during which this activity will last. Some Newcastle coke in sacks has been shipped to Chile experimentally. Prices for large and small lots of leading brands run from $4 to $4.50.

John Barnes, president of the W. F. & John Barnes Co., manufacturer of machine tools, Rockford, Ill., died May 29, aged 83 years. With his brother, W. F. Barnes, he founded the company in 1872.

Bar Price for 1917 Named

Western Mills Open Books to Implement Makers —Options Expire in East

Chicago, June 6.—Agricultural implement makers, who have been asking a price on soft steel bars for delivery during first half of 1917 are being given an opportunity, if regular customers, to cover at least part of their requirements for next year at 2.69c, Chicago mill, by the leading interest. This is the present nominal price and agricultural implement makers are the only ones for whom 1917 deliveries are being opened. Up to this time practically none of this tonnage has been placed as most farm implement builders regard the price as higher than they are able to pay. Other interests are willing to take care of their regular customers on the same basis and nowhere in the market is there a disposition to give a better price to this class of buyers than would be made to other consumers. Willingness to sell for first half of 1917 gives implement makers an opportunity to figure on their year's business, but the price is not attractive.

While most steel mills have considerable tonnage already booked, which cannot be delivered until the early months of 1917, no move has been made to take contracts for delivery in that period from general buyers. Just what method will be followed in apportioning first half tonnage is not certain. No especial pressure is being brought to cause mills to apportion their remaining tonnage, and it is believed this will not be done as far in advance of delivery as was the case at the beginning of the present year when second half tonnage was apportioned several months in advance. Nominal quotations remain steady at 2.69c, Chicago mill, for soft steel bars.

Hard steel bars are strong at 2.50c, Chicago mill, and some instances have been known where prompt delivery has been provided at $2 to $3 per ton higher than this quotation. Some consumers have been forced to change their specifications to larger sizes of bars in order to meet rolling conditions of mills and obtain their material without undue delay.

Bars Steady in Cleveland

Cleveland, June 6.—Activity in the Cleveland bar market is confined to contracting for future delivery. There is little premium business being transacted as most mills prefer to contract for the future. There have been some unfounded rumors of slowing-up, but local dealers are finding that a steady inquiry from a variety of sources is keeping the mills working at capacity. Instances have been noted of contracts closed as far ahead as the first half of next year. Prices are unchanged.

Options Allowed to Expire

Philadelphia, June 5.—Very few of the options for tonnages of shell steel for this year's shipment held by domestic and foreign munition makers, were exercised when they expired June 1. This means that these lots are to be purchased in the open market or not at all. The market shows still unclosed a heavy tonnage of shell steel. Both sales and new inquiries have been lighter. One eastern Pennsylvania munition maker has received a new order for 40,000 to 50,000 12-inch shell forgings for the English government which will require about 15,000 tons of steel. The South Brooklyn Machine Corporation is the low bidder at $2.76 each for machining 8,084 4.7-inch shells for the United States government for the Frankford arsenal. The Watertown arsenal was second bidder at $2.83 each. Little is being done in soft steel bars in the territory. There are buyers for contract at 2.50c, Pittsburgh, but the mills are not accepting this form of business. On a lot of odd sizes put before buyers here the latter offered 2c, Pittsburgh, but the mills are holding out for 2.50c, Pittsburgh, the regular standard bar price.

Steel Bars Active

Pittsburgh, June 6. — Specifications for steel bars for shipment to domestic consumers continue heavy, but no new buying of consequence is reported. Tremendous demand continues to exist for steel rounds for the manufacture of shells, and a number of interesting contracts recently have been placed in this district. Steel bars are being held at 2.50c for shipment the early part of 1917 and some mills actively have been soliciting orders for delivery the first quarter of next year.

Iron Bars Firm

Chicago, June 6.—Bar iron is quoted firmly at 2.35c, Chicago mill, for prompt delivery, which means 60 to 90 days. The quotation for third quarter delivery has been held at 2.50c, Chicago mill, and an interesting situation develops where prompt buying means third quarter delivery with specifications furnished at once. The market is interested to note whether the prompt price will go to 2.50c, Chicago, or third quarter business be taken at 2.35c, Chicago. The fact that prompt delivery from steel mills may be obtained at a lower premium than has been the case for sometime, gives rise to the opinion on the part of some buyers that the lower figure will prevail for third quarter. On the other hand, mills have plenty of business and believe conditions will warrant holding for the higher price.

(*For complete prices see page* 1296.)

Cotton Tie Market Not Opened

Pittsburgh, June 6.—The market for cotton ties has not yet been opened, although prices may be announced before the end of this week. It generally is believed that ties will command not less than $1 a bundle of 45 pounds, as against 85 cents a bundle obtained last year. Mills have been rolling cotton ties for a couple of months and shipments are being made to warehouses in the south.

Hoops and Bands

Pittsburgh, June 6.—Steel hoops are being offered at 2.75c and steel bands at 2.50c for delivery at the convenience of the mill which means, in most cases, for shipment the first quarter of 1917. Some manufacturers are asking $5 a ton above those figures for delivery the latter part of this year.

Shafting is Strong

Pittsburgh, June 6.—Warehouses are understood to have sold cold rolled steel shafting at as high as 50 per cent on the list, equivalent to $150 a ton. Manufacturers quote this product at a range from 10 to 20 per cent off the list for carloads and from 5 to 10 per cent off the list for less than carloads. Specifications are heavy, but new buying is light.

Cold Rolled Strip Steel

Pittsburgh, June 6.—Cold rolled strip steel for delivery the second half of this year is being sold at a range from 6c to 6.50c, base. New buying is light, due to the fact that consumers covered requirements earlier this year.

Ore Maintains Position

Cleveland, June 6. — Iron ore is maintaining its strong position, but with little activity in the Cleveland field. Shipments are moving rapidly due to the fact that furnaces are taking ore direct, eliminating the delay of unloading to docks. There were no inquiries of importance in the local market during the past week.

Structural Buyers Shy

High Prices Result in Caution—Large Consumers Think 3.00c, Mill, Too High

Philadelphia, June 5.—Care continues to be exercised by eastern structural buyers not to load up themselves with material at the present market. They are buying very little for stock purposes, once they have depleted their reserves accumulated on a low price plane, and they are not taking on new work except where they have specific protection from the mills or assurances of deliveries under running material contracts, so that they are obliged to pay premiums on only a small proportion of their needs. The larger buyers still oppose entering into fourth quarter contracts with eastern shape mills at 3c, Pittsburgh, but several more of the smaller consumers have closed for third quarter on that basis. The market continues quieter, but specifications against contracts are heavy. Prices range from 2.50c to 3c, Pittsburgh, depending upon the ability of the mill to deliver.

New York City Buys

New York, June 6.—New York City came into the market as a direct buyer of structural steel for subway and elevated work this week, when it took bids on 52,000 tons of riveted work on a delivered-but-not-erected basis. This tonnage included about 20,000 tons, upon which general contract bids have been taken previously and awards made. The city now will decide whether it will furnish the steel to the contractors under the bids just received or have the latter supply their own material. The American Bridge Co. proved to be the low bidder on about 32,000 tons, the McClintic-Marshall Co. on between 19,000 and 20,000 tons and the Pennsylvania Steel Co. on a small portion. The prices ranged from $62 to $87 per ton, delivered. The American Bridge Co. submitted an alternate bid of $62 per ton, delivered, or 3.10c per pound for the beams and shapes and $69 per ton, or 3.45c per pound, for the riveted steel. An additional charge of $8 per ton was quoted for delivery of material out of store. Some of the steel upon which the city has taken bids will not be delivered until 1918.

Structural Shapes Quiet

Pittsburgh, June 6.—The high cost of building materials has tended to minimize large structural undertakings, but fabricating shops are busy filling contracts placed some time ago and furnishing steel for emergency work. A number of structural projects are under consideration and a large amount of work will be released just as soon as more attractive prices are offered. Manufacturers are asking 2.50c for delivery at their convenience, which means for shipment the early part of 1917. One mill in the Greater Pittsburgh district recently has been selling structural material for shipment six or eight weeks hence at 3.50c and above.

Small Lettings in Cleveland

Cleveland, June 6.—An announcement has just been made that the Northern Ohio Traction & Light Co., Akron, has awarded a contract to the McClintic-Marshall Co. for 900 tons of structural material for a terminal and several other buildings to be erected at Akron. The bids were taken on this project some time ago and were previously noted. Structurals are being quoted at 2.50c to 3.00c, mill, for forward delivery and considerable business has been concluded at this figure. Several small tonnages are being figured quietly in the Cleveland district. It is expected that the first work on the new Forest City house, for which a contract was let to the American Bridge Co., will be started within the next 60 days.

Shape Market Dull

Chicago, June 6. — Buying of structural shapes is becoming steadily less, as those who can afford present high prices have filled their requirements. This has developed to the extent that some fabricators are willing to sell part of the stock they are now carrying, as it is difficult for them to dispose of it in fabricated form and they prefer to convert it into money rather than hold it for any length of time.

CONTRACTS AWARDED.

Northern Ohio Traction & Light Co., Akron, 900 tons to McClintic-Marshall Co. for terminal.

Steel work for section No. 1 of route No. 8 of the Fourteenth street subway line in Brooklyn, 4,900 tons, awarded by Booth & Flinn, the general contractors, to the American Bridge Co.

Crane runways for the Carpenter Steel Co., Reading, Pa., 300 tons to L. F. Shoemaker & Co.

Bridge over Warrier river in Alabama for the Alabama Southern railroad, 700 tons, to the American Bridge Co.

Bridge work for the Chesapeake & Ohio railroad, 270 tons, to an independent shop.

Section of Eastern Parkway subway from Buffalo to New Lots avenue, Manhattan, 15,700 tons, Conners Bros. awarded general contract and steel work expected to go to independent shops.

Schwartz garage, Broad and Cherry streets, Philadelphia, 200 tons, to the American Bridge Co.

Approaches to the Queensborough bridge, New York City, 250 tons, to the McClintic-Marshall Co.

Bridge work for the Central Railroad of New Jersey, 400 tons, to the McClintic-Marshall Co.

Power house for the Connecticut Co., New Haven, Conn., 300 tons, to Milliken Bros., Inc.

Subway section under Fourteenth street from Irving place to Avenue B, Manhattan, 4,000 tons, general contract awarded to the Degnon Contracting Co.

Service building for Underwood Typewriter Co. Vesey and Greenwich streets, New York City, 1,200 tons, to Empire Structural Steel Co.

Boys' club, Avenue A and East Tenth street, New York City, 450 tons, to Hay Foundry & Iron Works.

Building for Geographical Society, 155th street and Broadway, New York City, 250 tons, to the Prince Iron Works.

Residence for Isaac Guggenheim on Long Island, 250 tons, to Milliken Bros., Inc.

Poli theater, New Haven, Conn., 600 tons, to Harris-Silvers-Baker Co.

Ludlum Steel Co., Syracuse, N. Y., 700 tons, Blaw Steel Construction Co.

New York Central railroad grade crossing, Niagara Falls, N. Y., 850 tons, Fort Pitt Bridge Works.

Union Carbide Co., Niagara Falls, has awarded a contract to U. S. Steel Co., for 3,500 tons of structural material for a carbide plant at Saute, Norway.

CONTRACTS PENDING.

Viaduct for the Worth Bros. Co., Coatesville, Pa., 2,100 tons, bids taken.

Buildings for the General Chemical Co., for a Delaware point, 1,200 tons, bids being taken. Westinghouse, Church, Kerr & Co., New York, engineers in charge.

Three turntables for the Pennsylvania railroad, 250 tons, and bridges, 300 tons, for the same system, bids being taken.

Building for Colonial Trust Co., Philadelphia, 500 tons, bids being taken.

Waterman building, Cortlandt street and Broadway, New York City, 500 tons, bids being taken.

Buffalo Potteries Co., Buffalo, plant addition, about 325 tons of deformed rounds, bids to be taken soon.

Store and office building, George W. Spitzmiller, Buffalo, owner, taking bids, 100 tons.

The Texas Co., Port Arthur, Tex., has let a contract for I-beams, columns and trusses, 598 tons.

Thos. B. Jeffrey Co., power house, Kenosha, Wis., 575 tons, to Federal Bridge Co.

Merchants Central Heating Co. has let the structural steel for central station at Spokane, Wash., 254 tons.

(*For complete prices see page* 1296.)

Nuts, Bolts and Rivets

Pittsburgh, June 6.—Foreign nations are negotiating for heavy tonnages of nuts, bolts and rivets, but manufacturers in western Pennsylvania do not manifest much interest in inquiries for export, because of inability to meet the insistent demands of domestic consumers. No difficulty was experienced in establishing advanced quotations adopted the latter part of May. It is not unlikely that advances in price will be made.

Lower Spelter for Sheets

Galvanized Roofing Might Sell With Zinc at 9 Cents—Black Sheets Quieter

Youngstown, O., June 6.—The galvanized sheet market, after months of neglect, is again engaging the attention of the sales departments. Interest is still confined to speculations on the potentialities of the situation, as few sales are being made. The decline in the price of spelter during the past few weeks has brought about the present situation. The prediction was ventured Tuesday by one sales manager that spelter must decline to 9 cents before a genuine revival of the roofing trade would be witnessed. With spelter at 9 cents, this sales manager expected to see a heavy flood of orders from the roofing trade, which normally consumes somewhat more than 50 per cent of the galvanized sheets produced. Roughly, 9-cent spelter would mean 4-cent galvanized sheets, and other sales managers believed buyers would hesitate to buy even at that figure. Spelter's influence on the price of galvanized sheets is still important, but it is no longer the sole factor in causing present high prices. Since galvanized sheets were advanced to what have proved prohibitive levels, steel, acid and labor have all increased in value. Spelter at normal price levels, therefore, would not bring galvanized sheet prices down to the ante-bellum basis. The vagaries of the war time spelter market discourage any assumption that it is certain to continue the present slump. The galvanized market, however, has been dormant so long that even the present uncertain prospect of renewed buying has aroused great interest at all mills.

Galvanized sheets, which have been held at 4.85c to 5.25c for weeks, are now quoted at 4.75c to 4.85c. The minimum figure is quoted quite freely on sheets from stock. One sale which involved special conditions, was made this week at 4.60c, but the sale was not representative and 4.75c is the present minimum.

Inquiry for black sheets continues lighter than it was several weeks ago. However, new orders are generally in excess of the mills' capacity, the decrease being comparative. One explanation for the smaller number of inquiries advanced today, emphasizes anew the oddities of the present market. Some buyers, it was pointed out, were accustomed to think in terms of the old $1 differential per hundred pounds between galvanized and black sheets. Spelter's slump with the consequent softness in galvanized was influencing these buyers to hold up orders in expectation of a corresponding fall in the price of black sheets. This assumption is untenable with sheet bars at present levels.

An interesting sidelight on the present situation is the action of some mills in concentrating all of their activities on the heavier gages, that is No. 16 and thicker. With sheet bar supplies below full requirements, these mills are turning their raw material into the most remunerative form.

Sheet Output Sold Up

Philadelphia, June 5.—Leading eastern Pennsylvania sheet makers now are in such a position on orders booked that they have practically no tonnage for the open market during the remainder of this year. Their unrolled tonnage amounts to only a few thousand tons and this will scarcely be sufficient to cover normal miscellaneous orders. Prices for 10-gage blue annealed quoted by eastern Pennsylvania makers are from 3.75c to 4.00c, Pittsburgh, or 3.909c to 4.159c, Philadelphia.

Black Sheets Steady

Cleveland, June 6. — Black sheets are quoted at 2.90c to 3.00c, Pittsburgh, with a steady inquiry for this sort of material. The scarcity of this commodity makes it difficult to summarize the market, but it is the concensus of opinion that present prices will be maintained for some time.

Sheet Mills Busy in Pittsburgh

Pittsburgh, June 6.—Demand for special sheets for shipment abroad continues to be the outstanding feature of the market in western Pennsylvania and eastern Ohio. Builders of electrical equipment in Italy, France and Japan are offering premium prices if specifications for delivery can be met. Some of the larger mills in this district have sold rather heavy tonnages for export at prices considerably above those prevailing for domestic shipment. The domestic market is quiet, but this is not surprising, in view of the fact that most consumers covered requirements for the remainder of the year some time ago. Black and galvanized sheets reflect slight irregularity, the former being offered at as low as 2.90c for No. 28 gage by some mills. Most makers are asking 5c for No. 28 gage galvanized sheets, although reports of sales at 4.75c are heard. Blue annealed steel sheets, quoted at a range from 3c to 3.25c, base, in this district, are being held at 3.75c by a manufacturer in eastern Pennsylvania.

(*For complete prices see page* 1296.)

Blue Annealed Stronger

Chicago, June 6. — Blue annealed sheets from Nos. 10 to 16 gage are decidedly stronger and quotations have advanced $1 to $3 per ton. Present sales are being made on a basis of 3.24c to 3.44c, Chicago mill. Lighter gages have not advanced to the same degree. Black sheets remain about the same as has been the case for several weeks, although narower widths may be obtained from some mills as low as 3.04c, Chicago mill. No. 28 gage is quoted at 3.09c to 3.19c, Chicago mill. Demand is not heavy and mills are able to take on some prompt tonnage, although contracts already on books will keep them busy for several months.

Tin Plate is Active

Pittsburgh, June 6.—Tin plate reflects further strength. Mills are refusing to shade $5.50 and it is likely that the market will be established at $6, base, before July 1. Many consumers are attempting to supplement contracts placed the latter part of 1915 or the early part of 1916, finding that they had underestimated their requirements. Mills have not been able to build up large stocks. Heavy demand exists for export, but no large contracts have been placed this week for foreign shipment.

Wire Demand Heavy

Pittsburgh, June 6.—Demand for wire products for shipment to consumers in this country has fallen off slightly the last two weeks. Indications are that the summer months will be quiet but a temporary lull in activity will come as a relief to manufacturers anxious to replenish stocks. Demand for all kinds of wire material for foreign shipment is decidedly heavy. The French and Russian governments have been negotiating for a total of approximately 300,000 tons of barb wire and staples, contracts for which are expected to be placed at an early date. South American and far-eastern countries have been figuring in this market for barb wire, nails and staples.

No Let Up in Plate Demand

Eastern Ship Yards Crying for Tonnage—
New Inquiry From England

Philadelphia, June 5.—Ship builders both in this country and abroad are in the eastern market for heavy tonnages of plates; other buyers of this product are putting forth their requirements in undiminished amounts and some eastern mills report they have more business before them at present than at any time yet. The foreign inquiries for ship plates come mainly from England yards and call for at least 15,000 to 20,000 tons for October delivery. These prospective buyers are offering surprisingly attractive prices to the American mills and these vary only slightly from the high level of the domestic market. Atlantic coast yards have been inquiring for plates in good tonnage from certain eastern Pennsylvania mills, apparently to extend their sources of supply and possibly improve deliveries. A heavy tonnage of locomotive plates remains in the market. The minimum price generally quoted by eastern plate mills is 3.75c, Pittsburgh, and 4.00c, Pittsburgh, remains the common figure. One maker this week closed up several contracts for specifications in this, the third and the fourth quarters at 4.00c. One lot of about 5,000 tons for last quarter was taken. Specifications are very heavy. Despite all it can do to keep down their tonnage by hunting new sales as to buyer and tonnage, one leading eastern Pennsylvania producer reports that its active orders this week are the largest in history and still are growing.

Plate Market Quiet

Cleveland, June 6. — Inquiry for plates is not excessive and seems to be slowing up to a certain degree. There is no difficulty in disposing of material, but the insistent demand which characterized the market for a time is lacking. No new ship building of note is under consideration and there is a suspicion that present prices are checking buying.

Plates Strong, But Quiet

Pittsburgh, June 6.—The market for finished iron and steel products throughout the country is calmer, and both sellers and buyers appear more conservative than at any time during the last 10 months. There is no let-up of activity, however. Specifications against contracts have not fallen off and mills have not been able to catch up any in deliveries. There is scarcely any new buying and it is generally believed that the market will be quiet during the summer months. Steel plates are being held at a range from 2.75c to 2.90c by mills in this district for future delivery, which means some time after Jan. 1, next. Japan is negotiating for heavy tonnages of ship plates, but it is not known here whether any contracts have been placed recently by that nation.

Pipe is Advanced

Oil Country Goods Marked Up — Specifications Heavy

Pittsburgh, June 6.—Under date of June 1, the National Tube Co. sent out new cards, showing an advance of 1 cent per foot in the price of 2-inch tubing, drive and line pipe, which is equivalent to about $4 or $5 a ton. Other makers of steel pipe have adopted advanced prices. The A. M. Byers Co. and other wrought iron pipe manufacturers have announced a similar advance, affecting the price of wrought iron oil country goods. Standard merchant pipe and boiler tubes were not affected by changes in the price of oil country goods.

Cast Pipe Slow

Competition Keen in Bookings for Large Orders

New York, June 6.—Cast iron pipemakers in the east generally have followed the recent reduction in prices posted by some of the largest makers, and the schedules now are quoted $1 lower on all sizes. This brings 6-inch Class B to $29.50, New York City, and 4-inch to $32.50. Sharper competition which recently had produced a softness of the market, has been the cause of this reduction. The foundries especially have been lacking in bookings of the larger sizes and have competed aggressively for such business. The market continues quiet on standard pipe but flange work remains active. The United States Cast Iron Pipe & Foundry Co. is the low bidder on 1,500 tons of pipe for Buffalo at $38.50, delivered, for the 3's; $31.50 for the 4's, and $28.50 for the 6's and larger. The Metropolitan Water and Sewage Board, of Boston, will take bids June 9 on 500 tons of 12's and 16's and Olean, N. Y., June 7 on about 100 tons of 4, 6 and 8's.

(For complete prices see page 1296.)

Cast Pipe Demand Small

Chicago, June 6.—Although demand for cast iron pipe is becoming stronger, it remains unusually light for this season of the year. The present high price compared with last year is believed to be the reason. The United States Cast Iron Pipe & Foundry Co. has taken 211 tons at Morris, Minn.

Bids were opened at Waukegon, Ill., June 5, on 440 tons and at St. Paul, Minn., on the same day for 1,100 tons. Figures were taken at Logansport, Ind., June 7, on 130 tons and Sheboygan Falls, Wis., will open bids June 12 on 372 tons.

Business Not So Brisk

Birmingham, Ala., June 5.—While the melt in pipe shops has not decreased, the orders that have been coming in recently are small ones with specifications for rush delivery, indicating that they are for filling-in purposes. Business is not as brisk as it was a month ago. Some shops report more orders than others.

Warehouses Are Busy

New York, June 6.—There continues to be some variation in steel prices from store in this territory. Certain large jobbers are selling shapes and steel bars at 3.10c, and plates at 4c, delivered this district. Most of the warehouses, however, are holding shapes and bars at 3.25c, and plates at 4.25c, and report orders at these figures are being obtained without trouble. Some of the smaller jobbers are asking even higher prices. The present irregularity of the market appears to be due to the fact that some warehouses did not join in the advance recently from 3.10c on shapes and bars, and 4c on plates.

Selling Large Tonnage

Cincinnati, June 6. — Warehouses are selling large tonnages of structural and re-inforcing bars at from 3.20c to 3.50c. Building contractors are willing to pay good prices providing shipments can be made. The warehouses are having a hard time keeping their stocks from being depleted, as shipments from mills are slow. Prices are strong and show no tendency to change. Cold rolled bars are quoted at 20 per cent above the list price, and hot rolled bars from 3.20c to 3.75c. No. 28 black sheets are quoted 3.95c, f. o. b. Cincinnati.

Scrap Cheaper Than Ore

Borings and Turnings Reach Low Levels in Chicago Market—Other Centers Weak

Chicago, June 6.—Continued absence of buyers from the iron and steel market in Chicago is resulting in a steady drop in prices. Borings and turnings are now quoted from $5.75 to $6.25 per net ton, which is almost as low as the minimum during the dull period of 1914 and 1915. At present prices these products are cheaper than iron ore, where they can be used as a substitute. Most large consumers have heavy supplies in their yards and the buying movement, which has been expected for some time, appears to have been deferred.

Railroads are not selling much scrap at present, low prices offering no temptation to market whatever may have been accumulated. The Wabash railroad offers 4¼ track miles of steel rails, about 60 pounds, with angle bars. The Santa Fe railroad offers 1,500 tons, of which 500 tons are No. 1 steel rails. The Wabash railroad also offers 3,000 tons of scrap, including 700 tons of No. 1 wrought and 400 tons of No. 1 cast.

Scrap Quiet in Buffalo

Buffalo, June 6.—The market is holding to about the same pace of lessened activity previously noted. The principal consumer of heavy melting steel is not in the market at the present time. Sagging in prices is noted in this community and also in turnings, borings, bundled sheet scrap, grate bars, wrought pipe and busheling scrap. The general impression prevails with the dealers that prices are due to stiffen rather than to undergo any further falling off.

Easterners Buy on Dip

Philadelphia, June 5.—Some of the largest eastern Pennsylvania consumers of scrap have been overlooking no opportunity to increase with advantage their purchases for forward delivery during the present softness of the market. One steelmaker has brought its recent purchases of heavy melting steel for delivery to October up to a total of about 40,000 tonns. This tonnage was purchased at a range of $16.50 to $18.25, delivered, and some of the lowest priced lots were taken up in the past week, including 2,000 tons at $17 and some metal 50 cents under that figure. This buyer now has withdrawn from the market. Heavy melting steel has been sold to consumers down to $16.25, delivered. One transaction for 500 tons for future delivery at this figure was closed this week. Sales to dealers have been made around $16, delivered. Buyers of old material are few at present and sellers usually are obliged to make concessions to interest them. As a result the market is soft and quiet. Rerolling rails have been sold at $18, delivered. Several sales of standard low phosphorus scrap have been made at $23 at maker's plant in eastern Pennsylvania.

Machine Shop Turnings Sold

Cleveland, June 6.—Neglecting a small ripple stirred up by the purchase of 10,000 tons of machine shop turnings by a large Pittsburgh consumer, the iron and steel scrap market has retained all its characteristic dullness of the past few weeks. Few sales of importance have been recorded. A local mill is reported to have bought about 2,000 tons of heavy melting steel at $16 per gross ton, delivered, but the range of prices among dealers is more nearly $15.50 to $15.75. Mills do not care to buy except where small lots are obtainable at bargain prices.

Shipments that were held back by one of the local mills until last Thursday came in so fast after that day that the mill was forced to work under an embargo. The Brier Hill Steel Co., Youngstown, O., also is under an embargo. As far as can be seen at present, no hope for a radical change in the dull situation can be entertained.

Scrap is Weak

Cincinnati, June 6—The iron and steel scrap market is dull and weak, and dealers do not see any indication of better conditions until some of the larger consumers come back into the market for requirements. No regular level of prices is being maintained, as sellers are offering material for what they can get for it. The surplus in dealers' yards is large, which makes them unwilling to go out into the rural districts for the large tonnages that are available there. Heavy melting steel is generally quoted from $13.50 to $14 per gross ton, and No. 1 machine cast from $11.25 to $11.75 per net ton.

St. Louis Market Dull

St. Louis, June 6.—Dullness in scrap iron and steel and an indifferent attitude of consumers toward buying are the distinguishing characteristics of the market. Dealers are having difficulty in disposing of material since consumers are supplying their demands by purchasing small lots of forced movements at bargain prices. Stocks in the mill yards are said to be low indicating an early beginning of a buying movement which in turn will strengthen the market. Inquiries for relaying rails are brisk, but the supply is limited and prices are advancing. Offerings by the railroads last week were as follows: Wabash railroad, 2,000 tons; Chicago & Alton railroad, 750 tons; Missouri, Kansas & Texas railroad, 4,000 tons, and the Kansas City Southern railroad, 200 tons.

(*For complete prices see page* 1296.)

Weak in Birmingham

Birmingham, Ala., June 5. — The scrap market continues to yield in sympathy with offerings larger than consumption. A general reduction of 25 cents per ton in actual transactions is noted, while old steel rails and steel scrap have declined about 50 cents per ton. Wrought iron is about the only article that has stood firm and resisted the softening process. The disposition to buy for future delivery is lessening.

Scrap Dips Lower

Pittsburgh, June 6.—Iron and steel scrap reflects further weakness in the Greater Pittsburgh district. Some consumers recently have refused to pay $16.50 a ton for heavy melting steel, but no evidence of sales below that figure is found. Less than 90 days ago, it will be recalled, heavy melting steel of good quality was commanding $18.50 a ton. Other grades of scrap are correspondingly weak. Large tonnages are being rejected daily and no inquiries of importance are pending in the open market.

New York Market Soft

New York, June 6.—Brokers have been buying considerable heavy melting steel in this territory to apply on old orders with eastern Pennsylvania consumers and have been getting it around $14.35, New York, or $16.25, delivered. There are few new orders for steel or any grade, as the market is inactive and still is softening off in price. Munition makers in this territory are shipping turnings freely to steel works in eastern Pennsylvania, which have been buying direct. This grade is hard to sell at present. Middlemen are offering only $11, New York, for wrought pipe. Stove plate for New Jersey delivery has declined 25 to 50 cents.

Domestic Ferro is Lower

Increased Home Production Results in Easier Quotations—Foreign Alloys Inactive

New York, June 6.—Much disparity in prices for ferro-manganese for early delivery continues to be shown in the current market and this seems to be attributable to the increased competition of domestic makers with the English product. Domestic 80 per cent metal for spot or nearby shipment has been quoted from $225 to $250 per ton, at the furnaces, although one maker is reported recently to have sold several hundred tons for shipment through August at $300. A lot of 50 tons for June-July in the Chicago district is said to have gone at $225, furnace, and sellers report having encountered sales of 5 to 10-ton lots at this figure. The market on the domestic product for forward delivery covers a spread of $175 to $200, furnace, depending on the period of shipment. English makers are offering or selling very little metal at present. Some of them hold to $300, seaboard, for spot. A Youngstown steelmaker has been in the market for additional tonnage for both early and last half and is reported to have closed for 1,200 tons with a domestic maker for forward shipment. Other inquiry for 2,000 to 3,000 tons for last half is pending.

The increase in the domestic production of ferro-manganese continues. The Marshall furnace at Juniata, Pa., which has completed a run on spiegeleisen on a conversion arrangement with the New Jersey Zinc Co., now has been leased to the American Manganese Mfg. Co. for a fixed period, and this week was put on the production of ferro-manganese, using domestic and foreign ores. The ownership of the Temple, Pa., furnace, June 1 passed to the Seaboard Steel & Manganese Co., of which Hartley C. Wolle is president, Albert Broden, vice president, and John E. Sullivan, secretary and treasurer. Eventually, it is proposed to operate this furnace on ferro-manganese and spiegeleisen, using mainly domestic ores. The Delaware Steel & Ordnance Co. was the former owner of this furnace. This stack has been on foundry and forge iron.

Agents of English makers of ferro-manganese have been advised that the distribution of shipments to consumers in this country henceforth will be handled by the British consul general of New York instead of by private firms which have been doing this work under the authority of the British admiralty. The significance of placing this responsibility directly in the hands of official government representatives has not been made clear in the trade.

The spiegeleisen market has an easier tone and it is understood that offers of $55, furnace, for sizeable lots of 20 per cent for early delivery now will be entertained by some makers. The market previously had been quoted at from $58 to $60, furnace. A Canadian steelmaker who has been in the market for 3,000 tons, is reported to have closed with domestic makers. Another inquiry for 1,000 tons is current.

Foreign Manganese Ore Sold

Philadelphia, June 6.—Some further sizeable lots of foreign manganese ore have been sold to eastern makers of ferro-manganese and spiegeleisen within the past week at a price range reported to have been from 70 to 75 cents per unit, at tidewater. These prices are approximately the same as have obtained recently in the market for foreign manganese ore. Among the new sales was a definite tonnage of Indian ore, which may reach 7,000 tons, depending on freight accommodations. This is to be delivered at various intervals over the balance of the year. Another cargo of Cuban manganese ore, about 2,000 to 3,000 tons, has been sold within the 70 to 75-cent per unit range on the basis of 48 per cent mineral, which is the highest price yet paid for Cuban ore. Sellers of Indian manganese ore have been seeking offers for limited tonnages for 1917 delivery, owing to more favorable freight opportunities having arisen for that period. One of the domestic makers of ferro-manganese has arranged for some tonnage from new deposits in Central America and small lots of this ore already have been brought in.

Ferro-Alloys Quiet

Pittsburgh, June 6.—Eighty per cent ferro-manganese and other ferro-alloys continue to reflect the easier tone developed a few weeks ago. Sales of 80 per cent ferro-manganese are reported at a range from $250 to $325 a ton at the eastern seaboard. Not much tonnage has been sold and no inquiries of importance are pending. Spiegeleisen, which had been quoted at $2.50 a unit, recently has been offered at $2 a unit, or $60 a ton for 20 per cent material. Fifty per cent and lower grades of ferro-silicon are firmly held at current quotations, but new demand is not heavy. Prices of steel making metals, although still nominal, are not nearly so high as a few months ago.

(*For complete prices see page* 1296.)

Car Orders Less

Figures for May Show Big Drop—Considerable Foreign Inquiry

New York, June 6.—Foreign railroad systems continue large prospective buyers of equipment in this country and while some of these matters are active at the present time, they have not produced any new orders. The Russian State Railways continue in the market for from 7,000 to 30,000 cars and 800 locomotives. It is reported that the Seattle Car & Foundry Co. has received 1,000 additional steel cars for Russia. The French State Railways, which some time ago ordered 3,000 cars in this country and Canada, again are asking builders for figures on an indefinite number of cars. The French Marine Steel Forge Co. has ordered 25 gondolas additional from the Pressed Steel Car Co. Cuban roads remain in the market for about 1,000 cars. Car orders are very light, as domestic roads are doing practically nothing. The only order closed during the week was 300 wooden stock cars for the Illinois Central, which went to the American Car & Foundry Co. Car orders in May, according to the statistics of *The Iron Trade Review*, were the smallest of any month this year and totalled less than 4,500, compared with 7,000 in April; 8,750 in March; 12,900 in February, and 21,700 in January.

Little Rail Buying.

Chcago, June 6.—Selling of standard steel rails in small lots continues, bessemer rails being sold now for delivery during the present year and open-hearth rails for delivery next year. Considerable export rail tonnage is being figured, about 50,000 tons now being on inquiry for shipment to various countries in Europe and the orient. Some of this has been tentatively placed, but contracts have not been fully closed.

Bar Buying Lags

Chicago, June 6.—The only recent inquiry for freight cars is one by the Baltimore & Ohio railroad for 1,000 box cars, which probably will be placed in the east. The Russian government is said to have ordered 1,000 box cars from the Seattle Car & Foundry Co. The Illinois Central railroad has closed for 300 stock cars from the American Car & Foundry Co.

Pig Iron Output Sets New Record

May Production Was 3,363,926 Tons While Daily Output Averaged 108,514 Tons—Net Gain of Only One in Active Furnaces

THE blast furnaces of the country, having acquired the habit of setting new production records months ago, find the custom difficult to break. Despite the fact that the number of incoming stacks continues to dwindle, the May production of coke and anthracite pig iron was the highest ever made in any month. The output in May was 3,363,926 tons, compared with 3,225,496 tons in April, a gain of 138,430 tons. March, which had held the previous record, was surpassed by 36,000 tons. The record set in April for average daily production held the top position for only one month. The average daily production in May was 108,514 tons, against 107,517 tons in April, a gain of 997 tons.

AVERAGE DAILY PRODUCTION.

	1916.	1915.	1914.	1913.	1912.
Jan.	102,319	51,323	60,624	89,929	66,220
Feb.	106,157	59,521	67,450	92,095	72,372
Mar.	107,343	66,009	75,534	89,123	77,791
Apr.	107,517	70,484	75,383	91,812	79,254
May	108,514	72,747	67,646	90,865	80,753
June	.....	78,998	63,486	87,229	81,125
July	.....	82,687	63,075	82,525	77,502
Aug.	.....	89,510	64,403	81,839	80,650
Sept.	.....	94,478	62,757	83,137	81,482
Oct.	.....	100,656	57,007	81,933	86,569
Nov.	.....	101,174	50,042	74,322	87,985
Dec.	.....	103,278	48,236	63,746	89,590
Av'r'ge	106,365	81,022	62,934	83,980	80,124

May showed a net gain of only one in the number of active blast furnaces, 321 being in blast May 31, against 320 on April 30. This gain is the smallest of any month since the upturn began in January, 1915. It is interesting to note that since February there has been a net gain of only nine active furnaces. This compares with 27 during the previous three months, and 39, 28 and 29 during the respective three-month periods preceding. These figures encompass all of the gains, in the number of active furnaces, made since December, 1914, when the lowest number of stacks in years was in blast. The total gain during these 17 months is 171 stacks, an average of 10 monthly.

The steel works furnaces, as usual, made the largest comparative gain last month. The total output of non-merchant iron in May was 2,451,646 tons, against 2,346,806 tons in April, a gain of 104,840 tons. The steel works furnaces averaged daily during May 79,085 tons, against 78,227 tons in April, a gain of 858 tons.

The production of merchant iron in May was 872,340 tons, against 842,318 tons in April, a gain of 30,022 tons. The average daily output of merchant iron last month was 28,140 tons, against 28,077, a gain of 63 tons.

The grand daily average production so far this year is 106,365 tons, a higher figure than had been attained in any month prior to March, of this year.

Five merchant furnaces were relighted last month and five blown out. Three steel works furnaces were blown in and two blown out, a net gain of one. In all, eight were blown in and seven put out of blast.

The production of ferro in May was 21,384 tons, against 24,610 tons in April, a loss of 3,226 tons. Spiegel production in May was 18,556 tons, against 11,762 tons in April, a gain of 6,794 tons.

The merchant furnaces blown in last month were: Wayne, Detroit Furnace Co., May 23; Sheridan No. 2, Berkshire Iron Works, May 12; Alburtis No. 7, Thomas Iron Co., May 15; one Allens Creek, Bon Air Coal & Iron Co., May 7, and Rockwood No. 2, Roane Iron Co., May 19. Those blown out were: Jisco, Jackson Iron & Steel Co., May 20; Rebecca, Kittanning Iron & Steel Mfg. Co.; Low Moor "A", Low Moor Iron Co., May 21; Lynchburg, Oriskany Ore & Iron Corporation, May 15, and Pulaski, Pulaski Iron Co., May 19.

MONTHLY PRODUCTION.

	1916.	1915.	1914.
January	3,171,878	1,591,024	1,879,336
February	3,078,548	1,666,592	1,888,607
March	3,327,630	2,046,280	2,341,551
April	3,225,496	2,114,518	2,261,501
May	3,363,926	2,255,157	2,097,019
June	.....	2,369,932	1,904,566
Total 1st half.	.....	12,043,503	12,372,580
July	.....	2,563,311	1,955,324
August	.....	2,774,825	1,996,483
September	.....	2,834,342	1,882,718
October	.....	3,120,340	1,767,227
November	.....	3,035,235	1,501,269
December	.....	3,201,605	1,495,325
Total 2d half.	.....	17,529,658	10,598,346
Grand total	16,167,478	29,573,161	22,970,926

The steel works furnaces blown in last month were: Gary No. 12, Indiana Steel Co.; the New River No. 3, of Corrigan, McKinney & Co., May 13, and one Schoenberger, American Steel & Wire Co. Those blown out were: Ensley No. 6, Tennessee Coal, Iron & Railroad Co., May 8, and Minnequa "B", Colorado Fuel & Iron Co., May 31.

The Virginia Iron, Coal & Coke Co. relighted its Radford furnace on June 2.

The Reading Iron Co. relighted its Keystone stack on June 2.

J. J. Gray Jr. has surrendered his lease on the Standard furnace of the Standard Iron Co. This stack, which had been making ferro-phosphorus, is now running on pig iron.

A record run was made at the Steelton plant of the Pennsylvania Steel Co. last month. The largest tonnage ever produced at the plant was made.

MAY PIG IRON

States.	No. of stacks.	No. in blast last day of month. May.	April.	Total tonnage made. Merchant.	Non-Merchant.	Totals. May.	April.
Pennsylvania	155	131	129	247,231	1,135,739	1,382,970	1,358,043
Ohio	75	65	65	184,418	558,073	742,491	694,310
Alabama	45	27	28	149,901	73,641	223,542	227,378
Virginia	22	7	10	32,298	.....	32,298	33,007
New York	26	20	20	86,761	123,986	210,747	190,742
New Jersey	6	1	1	6,686	.....	6,686	1,538
Illinois	26	23	23	47,919	289,668	337,587	321,568
Colorado	6	3	4				
Indiana	10	10	9	37,397	212,024	249,421	245,324
Maryland	4	4	4				
Wisconsin	6	5	5				
Kentucky	7	4	4				
West Virginia	4	4	4	50,436	31,737	82,173	67,181
Tennessee	18	11	9				
Washington	1	0	0				
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	3	3	3	29,293	26,778	56,071	50,033
Michigan	3	3	2				
Missouri	1	0	0				
Spiegel—All states...						18,556	11,762
Ferro—All states....						21,384	24,610
Totals	423	321	320	872,340	2,451,646	3,363,926	3,225,496

Act on Boiler Plate

Pass Resolution Eliminating Requirement for Reduction of Area

Washington, June 6.—The executive committee of the board of supervising inspectors of steam vessels, today passed a resolution eliminating government requirements for the reduction of area of marine boiler plates, pending an investigation by the department of commerce. Steelmakers and others who conferred last Friday with the committee had requested that the area requirements be eliminated altogether and in addition urged that the required tensile strength be reduced from 63,000 to 60,000 pounds per square inch. The latter requirement was left unchanged. The department will take up further investigation at once, and it is believed, will permanently eliminate area requirements.

Stevenson Taylor, president of the American Bureau of Shipping, New York, acted as chairman and spokesman of the delegation of steelmakers, shipbuilders, boiler manufacturers, etc. The executive committee of the board of supervising inspectors consists of George Uhler, inspector general of the steamboat inspection service; Daniel J. Dougherty, supervising inspector, Pittsburgh, and Nils B. Nelson, supervising inspector, Cleveland.

The visiting delegation comprised the following:

C. F. Bailey, chief engineer Newport News Shipbuilding & Dry Dock Co., Newport News, Va.; W. P. Carnes, chief engineer, Harlan & Hollingsworth Corporation, Wilmington, Del.; A. W. Christian, assistant to the president Harlan & Hollingsworth Corporation; T. M. Cornbrooks, chief engineer Maryland Steel Co., Sparrows Point, Md.; H. J. Cox, Lloyds Register of Shipping, New York; C. L. Huston, vice president and general manager Lukens Iron & Steel Co., Coatesville, Pa.; E. T. Ickes, engineer of tests Worth Bros. Co., Coatesville, Pa.; L. D. Lovekin, chief engineer New York Shipbuilding Co, Camden, N. J.; A. J. Matteson, chief engineer Great Lakes Engineering Works, Detroit; J. F. Metten, chief engineer William Cramp & Sons Ship & Engine Building Co., Philadelphia: W. S. Newell, engineer Bath Iron Works, Bath, Me.; N. J. Pluymert, Bath Iron Works, Bath, Me.; J. Pusey, engineer Pusey & Jones Co., Wilmington, Del.; F. Smith, manager Pittsburgh Steamship Co., Cleveland; C. W. P. Rys, engineer of tests, Carnegie Steel Co., Pittsburgh; H. C. Taggart, engineer of tests Lukens Iron & Steel Co., Coatesville, Pa.; Stevenson Taylor, president American Bureau of Shipping, New York; D. D. Thomas, Maryland Steel Co., Sparrows Point, Md.; H. Warriner, chief engineer Fore River Shipbuilding Corporation, Quincy, Mass.; J. C. Workman, American Shipbuilding Co., Cleveland; M. Douglas Brews, M. A. Hanna & Co., Cleveland; J. H. Hinman, Heine Safety Boiler Co., St. Louis; C. S. McNeir, Seattle Construction & Dry Dock Co., Seattle, Wash.

Safety Engineers

Washington, June 6.—Establishment by the Colorado school of mines of a chair of safety engineering has resulted in many inquiries being made as to the development of this profession. The bureau of mines has been asked many times as to the number of persons following the profession, and as no information was on hand the bureau has gone to considerable trouble to secure the names and addresses of men who are engaged in the profession. A list has been compiled by the bureau, and, while it is probably incomplete, it is thought to contain the names of most of the prominent representatives of the profession. The list contains many engineers, 67 in number, who are associated with iron and steel companies, as well as ore mining concerns.

Exports Tremendous

Foreign Business Continues to Grow, But Believed to be Near Maximum

It is evident from figures covering iron and steel imports and exports for April that shipments of war materials, including shell steel, wire, etc., are approaching a maximum. Exports in April, 1916, aggregated 384,917 tons, compared with 223,448 tons in April, 1915. During the 10 months of the fiscal year ending April 1, 1916, the United States has exported 3,786,909 tons of steel products. The tremendous increase in foreign business can be readily appreciated by comparing this figure with the exports for the 10 months ending April 1, 1915, which aggregated only 1,382,140 tons. Imports also are increasing, the total for the 10 months up to April 1, 1916, being 1,067,252 gross tons, as compared with 884,004 tons imported from July 1 to April 1, 1915.

IMPORTS AND EXPORTS.

1915.	Imports, gross tons.	Exports, gross tons.
July	20,858	378,890
August	27,556	405,850
September	23,345	381,914
October	34,730	351,039
November	37,131	362,764
December	35,456	353,836
1916.		
January	15,824	354,416
February	20,279	368,869
March	26,212	438,054
April	20,176	384,917

The total value of the exports of iron and steel and manufactures thereof in April, 1916, was $58,722,411. This shows a slight increase over March, and is double the value of the total exports in April, 1915.

Machinery exports in March, 1916, were valued at $16,243,981, compared with $10,053,895 in March, 1915. Exports of zinc, with the exception of ore and dross, in March aggregated $3,142,321, as compared with $1,251,132.

EXPORTS OF MACHINERY.

1915.	Motor trucks.	Agricultural implements.	Aeroplanes.	Metal working machy.
June	$8,578,802	$854,670	$283,212	$3,735,562
July	6,803,001	963,534	880,836	3,872,358
Aug.	4,387,193	1,454,606	588,600	3,624,411
Sept.	5,882,255	1,092,797	101,950	3,256,973
Oct.	4,307,190	791,230	366,892	3,236,079
Nov.	3,837,307	1,054,235	13,770	4,644,713
Dec.	3,920,533	1,338,629	156,347	3,205,788
1916.				
Jan.	3,416,818	1,139,874	.....	3,249,595
Feb.	6,170,367	1,323,578	22,320	4,662,905
Mar.	4,909,179	2,287,605	8,400	6,501,022

IRON AND STEEL EXPORTS, GROSS TONS.

	April, 1916.	April, 1915.	Ten months ending April, 1916.	Ten months ending April, 1915.
Scrap	15,975	6,805	113,953	21,500
Pig iron	18,518	16,182	209,336	89,902
Billets, ingots and blooms of steel	88,764	41,321	703,021	123,026
Wire rods	14,555	14,967	137,797	69,066
Steel rails	22,346	10,991	443,197	105,394
Steel bars	58,213	20,233	486,443	134,648
Iron bars	5,201	3,054	57,098	7,678
Struc. iron and steel	19,999	12,764	221,894	131,740
Hoops, band and scroll	2,671	1,834	33,968	11,510
Sheets and plates	38,938	26,794	404,047	208,499
Tin and terne plates	21,385	9,083	175,134	65,208
Barbed wire	27,688	16,720	287,542	105,282
All oth. wire	20,410	16,981	198,516	99,879
Cut nails	174	421	3,434	1,852
Wire nails	10,884	5,043	99,305	38,831
All oth. nails incl. tacks	634	487	7,822	3,463
Pipes & fit'gs	12,423	16,255	143,185	137,783
R. R. spikes	3,056	250	22,346	4,618
Bolts, nuts, rivets, and washers	2,265	1,322	26,194	10,746
Horseshoes	695	1,781	10,705	9,195
Cast radiat.	123	160	1,972	2,320
Total	384,917	223,448	3,786,909	1,382,140

IRON AND STEEL IMPORTS, GROSS TONS.

	April, 1916.	April, 1915.	Ten months, ending April, 1916.	Ten months, ending April, 1915.
Scrap	6,116	2,310	85,737	27,613
Pig iron	8,680	3,080	94,224	88,673
Ingots blooms, billets of steel	3,208	1,355	16,904	22,818
Wire rods	302	382	3,693	3,853
Rails	438	8,921	40,037	24,612
Bar iron	956	270	6,127	9,387
Structural	140	143	1,237	5,506
Sheets & plates	157	59	1,466	2,376
Tin and terne plate	179	44	673	4,652
Total	20,176	16,564	250,098	189,490

IRON ORE IMPORTS, GROSS TONS.

	March, 1916.	March, 1915.	Nine months ending March, 1916.	Nine months ending March, 1915.
Spain	6,276	.....	63,610	46,115
Sweden	29,706	6,410	159,307	143,509
Canada	741	134	83,863	36,567
Newfoundland & Labrador	.....	.....	.....	17,500
Cuba	57,660	57,920	632,399	559,041
Oth. countries	.....	23,938	128,073	81,272
Total	94,383	88,402	1,067,252	884,004

John Barnes, president of W. F. & John Barnes Co., Rockford, Ill., pioneer manufacturer in that locality, is dead at his home at that city, aged 82 years.

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

HARRY L. RITTENHAUSE, sales manager of the forge department of the Pennsylvania Steel Co., has resigned his position to become connected with the Philadelphia Steel & Forge Co.

George J. Young, now professor of mining engineering at the University of Minnesota, has been appointed to the professorship of metallurgy at the Colorado School of Mines, Golden.

Andrew Bryson has resigned the presidency and severed his connections with the Brylgon Steel Casting Co., New Castle, Del., recently purchased by the American Manganese Steel Co., Chicago.

Henry B. Joy, president of the Packard Motor Car Co., Detroit, has resigned to become chairman of the board of directors. He has been succeeded as president by Alvin Macauley, vice president and general manager.

Employes of the maintenance department of the Pennsylvania Steel Co., Steelton, Pa., tendered a farewell banquet to William Smith, former master mechanic, at the Plaza hotel, Harrisburg, recently. Covers were laid for 45 guests.

Charles A. Gross, who has been connected with the structural sales department of the Bethlehem Steel Co., at New York, has resigned and has become identified with the Harris-Silvers-Baker Co., New York fabricators.

G. W. Bickerton has been appointed chief draftsman of the Youngstown Sheet & Tube Co., Youngstown, to succeed L. Thomas, resigned. C. O. Weissenburger has been appointed assistant to the chief engineer.

George Robert Kraft of Durban, South Africa, was in Pittsburgh recently, conferring with manufacturers of steam shovels, concrete mixers and irrigation implements. Mr. Kraft says he may purchase $1,000,000 worth of farm machinery in this country.

A. L. Humphrey, vice president and general manager of the Westinghouse Air Brake Co., Wilmerding, Pa., recently talked about the "Mobilization of Material and Industrial Resources" at the Carnegie Music Hall, Pittsburgh, where a series of lectures on military engineering recently had been given.

Henry M. Shaw, formerly eastern representative of the Gardner Machine Co., Beloit, Wis., has associated himself with the Sherritt & Stoer Co., Inc., 603 Finance building, Philadelphia, and will represent it in connection with its regular line, giving special attention to the Gardner products.

Robert Haig, who has been chief supervisor of Lloyds inspection bureau in the east for a number of years, with headquarters in the Bourse, Philadelphia, has resigned to become connected in a leading capacity with the Sun Shipbuilding Co., which is building a large shipyard at Chester, Pa.

W. H. Thompson and Albert H. Wiggin have resigned as directors of the Hendee Mfg. Co., Springfield, Mass., and are succeeded by A. F. Knobloch Jr. and Samuel H. Muller, the latter being vice president of the Chase National bank, New York.

John W. Higgins, president and treasurer of the Worcester Pressed Steel Co., Worcester, Mass., and second vice president of the National Metal Trades Association, will make an automobile trip through the middle west this month.

Larkin F. Jordan, formerly assistant manager of the railway and fuel oil departments of the Texas Co., with headquarters in Chicago, Friday was named president of the Pennsylvania Tank Car Co., Sharon, O., succeeding Osborne Mitchell, who will be retained as general counsel for the company and subsidiaries.

F. W. Poynor, in charge of the engineering branch of R. Martens & Co., Inc., New York, sailed for Bergen on June 3. Mr. Poynor took with him thousands of catalogs describing the products of American machine tool manufacturers, and his company, which has its headquarters in Petrograd, will conduct a campaign intended to promote the sale of American-made machine tools in Russia after the war.

Clyde E. Dickey has resigned his position as secretary and sales manager of Denman & Davis, New York, with whom he has been associated for the past 11 years and has organized the Dickey Steel Co., with offices in the Woolworth building, 233 Broadway, New York. He is president of the new company, which will represent several manufacturers of high-grade steel. Mr. Dickey was with the Crucible Steel Co. of America for about five years prior to his connection with Denman & Davis.

W. C. Durant, president of the Chevrolet Motor Co., has been made president of the General Motors Co., succeeding Chas. W. Nash, resigned. Mr. Nash remains on the board of directors. Mr. Durant previously had been in charge of the management of the General Motors Co., but was deposed in 1910 when the company's affairs were administered under a committee of bankers. W. C. Leland, vice president and general manager of the Cadillac Motor Co., Detroit, has been elected a director of the General Motors Co., succeeding Albert Strauss.

Newton Drilling Machine

In a description of a two-spindle frame drilling machine appearing on pages 1208 and 1209 of the June 1 issue of *The Iron Trade Review*, the name of the manufacturer, the Newton Machine Tool Works, Inc., Philadelphia, was inadvertently omitted. The Newton company has been manufacturing special drilling machinery for a number of years, and the article mentioned described a late invention embodying an unusual number of improvements.

Eleven Convicted

Eleven men were convicted at Pittsburgh, June 3, by the jury chosen to investigate charges against alleged leaders of riots at Braddock, Pa., May 2 and 3, when a number of industrial plants were entered. Fred H. Merrick was convicted on two counts, one of inciting riot and the other of riot, and 10 others were convicted on the charge of riot. Most of the men are foreigners. The maximum penalty for rioting or inciting riot in Pennsylvania is a fine of $500 and imprisonment for two years. Fourteen persons, indicted by the grand jury in connection with the riots, were acquitted.

Thomas McNeil Sr., 75 years old, president of James McNeil Bros. Co., Pittsburgh, died at the St. Charles hotel, Atlantic City, May 28.

Ocean Rates Lower

Competition is Felt in Trade to Certain European Ports

New York, June 6.—A movement toward lower ocean freights on iron and steel products to Europe continues, but as not all destinations have been affected in the same way, the situation is irregular and spotty. The greatest easiness continues to be to the United Kingdom and northern ports of France. Tonnage for these points seems less liberal, and a number of boats have been granting sharp concessions to pick up needed portions of cargoes. One quotation of 30 cents per 100 pounds, or about $11 per ton to the United Kingdom for 1,000 tons of billets, was made in this district the past week. Another shipper was offered a rate of 85 cents per 100 pounds on 1,000 tons of billets, immediate shipment, from New York to British ports; 90 cents for immediate shipment from Baltimore and 95 cents for June and July from Baltimore. Shippers this week offered $17.75 per ton on wire rods from northern ports to England, early shipment, but there were no takers. Previous rates on billets to the United Kingdom have been quoted at $30 per ton, and upward.

From the south, $20 per ton on billets and pig iron is quoted from New Orleans to Liverpool; $50 to Gothenburg; $50 to Christiania; $55 to Copenhagen, and $30 to Marseilles, Bordeaux or Havre. No room is offered from the south to Genoa. Pig iron shippers have had difficulty to obtain $30 or lower from southern ports to Italian destinations.

Ore Receipts Heavy

Out of a total on 8,449,580 gross tons of iron ore shipped during May, 6,365,341 tons were received at Lake Erie ports, distributed as follows:

Port.	Gross tons.
Port Colborne	9,858
Buffalo	921,553
Erie	112,989
Conneaut	1,198,287
Ashtabula	1,386,707
Fairport	350,719
Cleveland	1,338,958
Lorain	588,293
Huron	142,536
Toledo	263,457
Detroit	51,984
Total	6,365,341

Big Pipe Line Project

Pittsburgh, June 7. (By wire.)—The Sinclair Oil & Refiining Co., recently organized with an authorized capital stock of $50,000,000, is understood to be contemplating a pipe line to extend from the Oklahoma fields to a distributing point in the central west. If proposed plans are carried out, about 500 miles of pipe will be involved. H. F. Sinclair is president and J. M. Cudahy is vice president of the company.

Wants Sulphate

Inquiry Appears in New York—Benzol is Steady.

New inquiries for ammonium sulphate have originated recently in Greece and a fair amount of business has been offered for nearby shipment. This order, however, is likely to go to England as British producers are shipping some of their output. Heretofore, Greece has drawn her supplies of sulphate from European sources. Contracting for sulphate for the next 12 months' delivery by domestic fertilizer manufacturers, continues to be delayed and no business of this kind yet has been entered.

Foreign Inquiry

For Pig Iron Appears in the East—Domestic Inquiry Out

New York, June 7. (By wire.)—An eastern railway equipment maker has entered the market for from 4,000 to 5,000 tons of foundry and high silicon pig iron, for delivery to various plants during the remainder of the year. Heavy export pig iron inquiry continues. New lots now before the market include two inquiries for 10,000 tons of special bessemer iron, 1,500 tons of low phosphorus for Italy and 2,000 tons of low phosphorus for Japan.

Bids Being Taken

New York, June 7. (By wire.)—Steel bids are now being taken for the new steel plant of the Mark Mfg. Co., Chicago. It is estimated this project will require about 10,000 tons.

With Non-Ferrous Metals

Copper **Lead** **Spelter** **Tin**

THE resumption of activity in the spelter market during the past few days calls forth memories of similar movements which have occurred since this metal first started is skyrocket performance back in the early part of 1915. It may be recalled that four times during the past year or so spelter has fallen off only to pick up again, but it has never entirely recovered the lost ground. This gradual tendency downward is only the natural result of a tremendously increased production. Circumstances entered into the last slump, which, in the opinion of several large producers, sent the market lower than was justified by the increase in production. There was a cessation of foreign buying and domestic manufacturers were fairly well supplied as to their immediate needs. There was also the psychological effect of peace talk to be considered. All this made the situation susceptible to bearish influences. Consequently the market dropped lower than the actual statistical position called for, and it is now thought that a material advance is in order. The domestic manufacturers will soon be forced to cover on their requirements.

The New York Market

New York, June 6.—The metal markets generally have taken on a more satisfactory tone during the week closing today. The long continued declines in spelter and antimony were arrested, aluminum advanced and copper remained steady, while only lead and tin reflected further declines. Copper was quiet but did not show much of a tendency to sag off further on offers by second hands. The outside market on electrolytic is quoted as follows: 28.25c to 28.50c, cash, for prompt and June; 28c to 28.25c, cash, for July and August; 27.75c to 28c, cash, for September and October. Ordinary lake copper for prompt and June shipment is quoted in the outside market at 28c to 28.25c, cash. Ordinary casting copper is held at 26c to 26.25c, cash.

A good business, finally is being done in spelter. There is some foreign business, but it comes mainly from domestic galvanizers and dealers. As a result, prices again are advancing. Prime western is quoted as follows: Prompt 13.37½c to 13.62½c, St. Louis; June, 13.25c to 13.50c; July, 12.87½c to 13c; August ,12.37½c to 12.50c; September, 11.87½c to 12c; fourth quarter, 11c.

The American Smelting & Refining Co., late Friday reduced its asking price to 7c, New York, and 6.92½c, St. Louis. The market since has been dull. The outside market is quoted at 6.85c, St. Louis, and 6.95c to 7c, New York.

Antimony inquiry yesterday and today has been much improved and some business is resulting. The market on spot is quoted at 23.50c to 24.50c, New York, while future prices are indefinite.

The outside aluminum market continues exceedingly strong and reflects somewhat higher prices by reason of the scarcity of supplies. No. 1 virgin ingot aluminum is quoted at 60c to 62c in carload lots. No. 1 remelted is quoted at the same level. No. 12 alloy is dull and is quoted at 49c to 50c in carload lots.

The tin market is somewhat reactionary, due partly to lack of demand, and partly to assurances of better shipments from London in the future. The market today is quoted as follows: Spot, 44.25c to 44.50c; June, 44c; July 43c; August 42c; September, 41c; last quarter, 40.50c.

(*For complete prices see page* 1296.)

The By-Products of Coke Making—II

THE SECOND installment of a comprehensive analysis of the by-product coke oven industry. In this issue the author deals with the manufacture of coke-oven gas, and the recovery of benzol, toluol, xylol and cyanogen. After the effect of the war has passed, benzol will compete with gasoline as motor fuel

BY WILLIAM HAMLIN CHILDS

THE amount of coke-oven gas that is available in making by-product coke for a modern blast furnace is very large, and its relation to the consuming power of the usual city is not generally appreciated. For example, a modern plant of, say, 40 ovens, which is about the minimum and corresponds to a 400-ton furnace, would produce about 3,250,000 feet of gas per day. This, under ordinary circumstances, would supply a city of at least 150,000 inhabitants. There are only 25 cities of this size in the United States east of the Rocky mountains and all of these are supplied with gas, some of them with coke-oven gas. There are already upwards of 46 by-product coke-oven plants in existence, and some under construction. A list of the places supplied wholly or in part with coke-oven gas, together with the price of gas, is given in Table I. It has frequently been possible to supply a group of two or more towns from a single by-product oven plant, the plant at Camden, N. J., supplying several other towns through high-pressure transmission lines, and the plant at Joliet, Ill., serving Aurora, Elgin and La Grange, Ill.

Table I

Cities and Towns in the United States of 5,000 or More Inhabitants Using Coke-Oven Gas[1]

Manufacturing or Distributing Co.[3] and Points Supplied.[4]	Location	Net Price[2]
Birmingham-Tuscaloosa R. R. & Utilities Co. Tuscaloosa, Ala.	Tuscaloosa, Ala.	$0.90
Coal Products Mfg. Co. Joliet, Aurora, Elgin, La Grange, Ill.	Joliet, Ill.	.90
North Shore Gas Co. Waukegan, Ill.	Waukegan, Ill.	1.00
Citizens' Gas Co. Indianapolis, Ind.	Indianapolis, Ind.	.55
Linton Gas Co. Linton, Ind.	Linton, Ind.	1.00
Maryland Steel Co. Baltimore, Md.	Sparrows Point, Md.	.75
New England Gas & Coke Co. Boston and suburbs; Milton, Charleston, Quincy, Mass.	Boston, Mass.	.80
Detroit City Gas Co. Detroit, Wyandotte, Mich.	Detroit, Mich.	.85
La Clede Gas Light Co. St. Louis and suburbs.	St. Louis, Mo.	.80
Zenith Furnace Co. Duluth, Minn.; Superior, Wis.	Duluth, Minn.	.75[5] 1.00[6]
Camden Coke Co. Camden, Gloucester, Trenton, Burlington, No. Plainfield, Somerville, New Brunswick, So. Amboy, N. J.	Camden, N. J.	.90
Empire Coke Co. Geneva, Auburn, Newark, N. Y.	Geneva, N. Y.	Fuel, 1.00 Light, 1.25
Hamilton-Otto Coke Co. Hamilton, Ohio.	Hamilton, Ohio.	.30
Philadelphia & Suburban Gas & Electric Co. Chester, Darby, Pa.	Chester, Pa.	1.00
Harrisburg Gas Co. Harrisburg, Steelton, Middletown, Pa.	Harrisburg, Pa.	1.00
Allegheny By-Product Coke Oven Co. McKeesport, Pa.	McKeesport, Pa.	.22½
Chattanooga Gas Co. Chattanooga, Tenn.	Chattanooga, Tenn.	1.00
Seattle Lighting Co. Seattle, Wash.	Seattle, Wash.	1.00
Milwaukee Coke & Gas Co. Milwaukee, West Allis, Wis.	Milwaukee, Wis.	.75

[1]Statistics from Brown's Directory of American Gas Companies for 1916.
[2]Prices are net for first supply to consumer. Gross prices are generally 10 cents in advance of the net where the latter is $1.00 or over, and 5 cents in advance of the net where latter is below $1.00.
[3]Total number manufacturing or distributing companies listed, 19.
[4]Total number cities or towns listed, 40.
[5]Duluth.
[6]Superior.

A fair typical analysis of rich gas from coal 30 per cent volatile matter would be as shown in Table II, page 1260. The calorific power of the gas will average between 580 and 620 B. T. U. per cubic foot and the candle power from 12 to 16. The lean or oven-heating gas has in the neighborhood of 500 to 580 B. T. U. As the coking period has decreased to between 16 and 20 hours in the latest ovens, the heat efficiency of the oven has increased, and with it the amount of surplus gas, but as the rich fraction is taken over a longer time the quality of the gas is necessarily somewhat lower. As stated previously, it is usual to estimate 11,000 cubic feet of gas from a ton of coal, of which 5,000 or less will be required for coking and 6,000 feet or more will be available surplus. Authentic reports are at hand which show a yield from a recent coke-oven plant of over 12,000 cubic feet of gas per net ton of coal, containing less than 5½ per cent of carbonic acid and nitrogen. Of this gas less than 40 per cent of the heat value was used in coking, so that the surplus corresponded to 7,200 cubic feet. The coal was a mixture of 40 per cent low volatile and 60 per cent high volatile coal, which would average about 30 per cent volatile. The total amount of heat lost in waste gases and radiation at this plant was less than 4½ per cent of the total heat in the coal. A large number of uses have been found for coke oven gas around steel plants, aside from steam raising, as in open-hearth steel furnaces, soaking pits, drying ladles, heating furnaces, etc. There is also a wide field, though not particularly high-priced, where natural gas for industrial purposes is failing. One important use, namely, for power development in gas engines, has not received the attention in this country that it has in Europe. So far as information is available, the only large gas engine installation using coke-oven gas in this country is at Lebanon, Pa., where four 1,200-horsepower engines using gas from the Semet-Solvay plant there develop electrical power for operating the Cornwall ore banks. According to published data, gas engines aggregating over 200,000 horsepower for operation with coke-oven gas have been installed in

Delivered at the New York meeting of the American Iron and Steel Institute, May 26-27, 1916. The author, William Hamlin Childs, is president of the Barrett Co., New York.

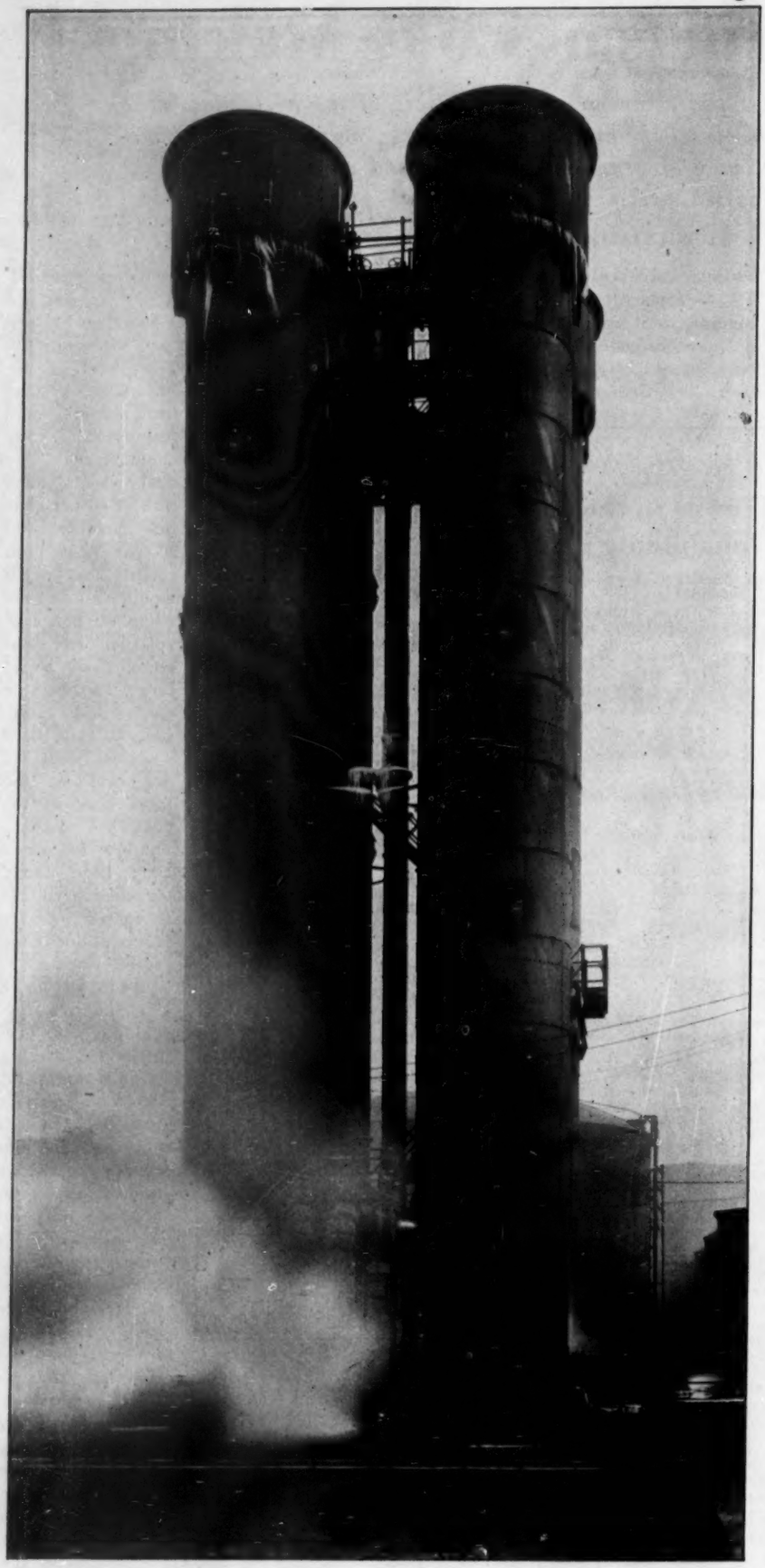


FIG. 1—BENZOL SCRUBBERS IN A BY-PRODUCT PLANT. PETROLEUM "STRAW" OIL IS USED IN THE WASHING PROCESS IN AMERICAN PRACTICE. IN ENGLAND TAR CREOSOTE OIL IS USED FOR THIS PURPOSE

Europe by three of the principal builders since the year 1904. A guarantee of 1 horsepower per hour with 27 cubic feet of average gas is not considered out of the way, which would mean about 200 horsepower-hours per ton of coal, or for each modern coke oven the capacity to produce 125 horsepower continuously, as long as it is in operation. A battery of 80 ovens would yield 10,000 horsepower.

While it is realized that various practical difficulties lie in the way before such results may be arrived at, there is good reason to think that they have been overcome by others, and that the prospect is by no means a hopeless one.

Benzol, Toluol and Xylol

The recovery of benzol, together with its homologues, toluol and xylol, is more properly dealt with in connection with the gas than with the tar, as by far the larger portion of these oils is found in the gas, although chemically they are classed with the coal tar derivatives. There is, of course no exact proportion, but a recovery of 2½ gallons of light oil from the gas from one ton of coal carbonized is common,

Table II

Analysis of Coke-Oven Gas

	Per Cent
Methane	31
Hydrogen	48
Illuminants	5
Carbon Monoxide	6
Carbon Dioxide	4
Oxygen	0.5
Nitrogen	5.5
	100

while the corresponding fraction of the tar would probably be less than one-tenth of a gallon.

The actual recovery of benzol is a relatively simple matter. It is based upon the property of certain high boiling oils to absorb the crude benzol vapors from the gas, and to yield them up again when heated to a temperature below their own boiling point. The oil employed for this washing is what is known as petroleum "straw" oil or tar creosote oil. English practice prefers a tar creosote oil distilling from 220 to 250 degrees Cent. although heavier oils distilling from 250 to 300 degrees are also used. All the American benzol plants use the petroleum "straw" oil because it is cheaper than coal tar oils.

The washing of oven gas with oil for benzol is practically parallel to the washing with water to recover ammonia, the guiding principle being to bring the gas in intimate contact with a maximum surface of the cool washing liquid. The benzolized oil passes from the washer through a preliminary heater to the still, where the benzol vapors are driven off by a combination of direct and indirect steam. The exit oil is cooled and

returned to the benzol washers, while the benzol vapors pass to the condenser and are delivered as light oil. This contains possibly 10 to 15 per cent toluol, and 45 to 55 per cent benzol, with small amounts of xylol and naphthalene. From this crude light oil the refined products are obtained by successive distillation and by treatment with the sulphuric acid and alkali. Benzol is usually made as 50 per cent, 90 per cent and 100 per cent grades, the percentages referring to the amount that will distill over 100 degrees Cent., not to actual purity. For pure benzol the specification requires that 100 per cent shall distill over within a range of 2 degrees Cent., within which range shall be the true boiling point of benzol.

Benzol recovery has long been a part of regular condensing house practice in Germany. As but little of the German coke oven gas is used for illuminating purposes, the loss of candlepower due to benzol removal is of little importance, and the loss of heating value only amounts to 3½ to 4½ per cent. The large amounts of benzol so recovered have furnished not only the raw material for that portion of the chemical and dyestuff industry, but also the larger quantity used for gas enrichment, solvents and motor fuel.

In the United States most of the coke oven plants that make illuminating gas have until recently found a good market for benzol by leaving it in the gas to increase its candlepower. But even where the gas was used for fuel exclusively the operators have been slow to install benzol recovery plants because of the limited demand in chemical manufacture, and the low price of gasoline, with which it would have to compete as a motor fuel. Up to the time that the European war began, benzol recovery was confined to the plants of one organization, although several others had recently made contracts for benzol installations.

The Benzol Situation

Until the war demands for benzol and toluol arose, their chief uses in this country were as solvents for rubber, in paints and varnishes, paint and varnish removers, grease extraction, imitation leather, and as a basis for making other chemicals, as aniline, benzoic, saccharin, etc. With the outbreak of war, a complete change has come over the benzol situation. This country found itself with a growing demand for benzol and toluol derivatives, and at the same time deprived of any outside source of supply.

Toluol, the basis of trinitrotoluol, now the most fashionable explosive in European war circles, jumped from 30 cents a gallon to $4.50 or upwards. Benzol, in moderate but increasing demand at 25 cents a gallon, suddenly climbed to 80 cents as the basis of synthetic phenol, an essential in making picric acid, and for the manufacture of aniline oil—an important factor in the dyestuff industry.

Benzol After the War

Accordingly, benzol recovery plants were installed right and left, as rapidly as they could be constructed, and are now in operation or contemplated at nearly all of the by-product coke plants. The estimated figures for the production of light oils from gas washing, so far as they are obtainable, indicate that in 1914 about 6,000,000 gallons were made, and in 1915 about 14,000,000 gallons. For the year 1916, if all existing works and those expected to come into operation are kept in service, it is expected that the output will exceed 22,000,000 gallons. If we assume that all the metallurgical coke now used was made with benzol recovery, the quantity of refined benzol available would be upwards of 100,000,000 gallons per year. Under such circumstances it would have to be used as a motor fuel, on the same basis as gasoline. The gasoline consumption of the United States is estimated at over 1,000,000,000 gallons, so that even if the present maximum recovery were made, the total would equal only 10 per cent of the gasoline now used. To put it differently, on the average consumption of 450 gallons per car per year, the maximum benzol recovery would serve for 222,000 cars. There were two million motor cars licensed in the United states in 1915, over 500,000 more than in 1914. An increase of a million is confidently predicted in 1916, which would take care of four times the maximum benzol production figure above. There is, therefore, ample room for any benzol surplus in immediate prospect. As a motor fuel 90 per cent benzol is actually 20 to 25 per cent more efficient per gallon than gasoline, a statement that has been demonstrated by numerous tests on the road, the only difference in operation being a slight adjustment of the carburetor. A mixture of gasoline and benzol can be used without carburetor adjustment, and with both convenience and economy.

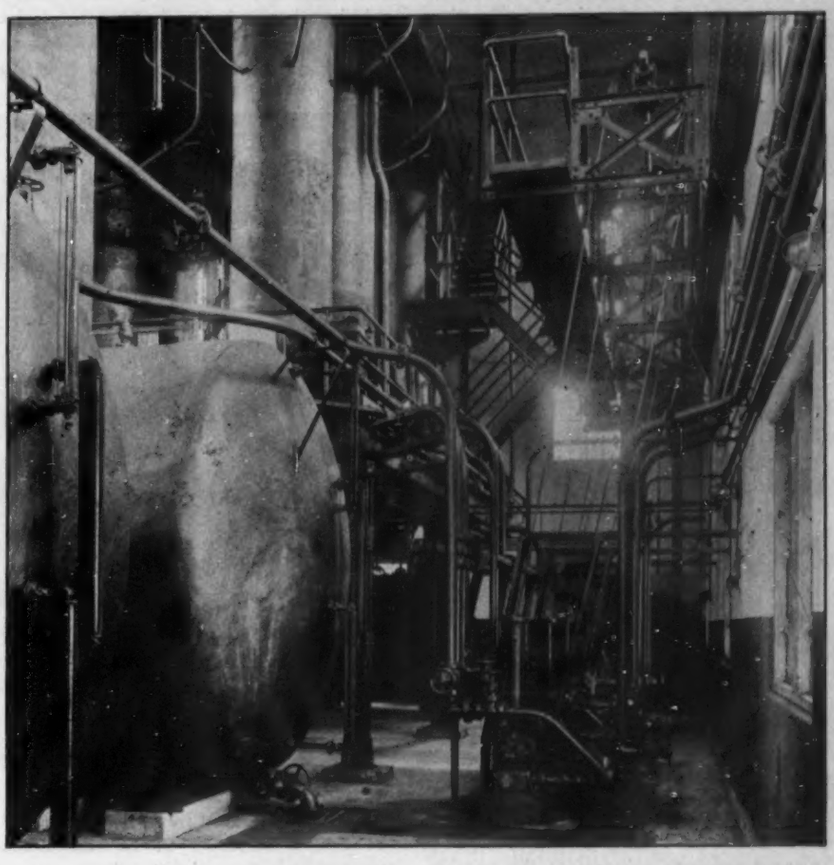


FIG. 2—STILLS IN WHICH BENZOL VAPORS ARE DRIVEN OFF BY STEAM

Cyanogen

The gas from the by-product coke ovens or gas retorts usually contains hydrocyanic acid, HCN, either in the form of the acid itself or as ammonium cyanide, its presence being usually attributed to the breaking down of ammonia on exposure to heated coke or other heated surfaces. The iron oxide

purifier removes a variable amount of cyanogen, CN, from the gas, the spent oxide being sometimes purchased from gas works when the cyanogen content justifies it and worked up into yellow prussiate of potash or some equivalent form.

The direct removal of cyanogen from coal gas may be accomplished by any one of several methods, among which are the Bueb, the Davis-Neill, the Feld, etc. The former is perhaps the best known and is in operation at the Astoria works of the Consolidated Gas Co. Its product is an insoluble cyanid sludge, ammonium ferro-ferrocyanid, which is sold on the basis of its cyanid content calculated as yellow prussiate of potash. As present prices for sodium salts are very materially lower than those for potash, the sodium ferro-cyanid is made. Owing to the use of a ferrous sulphate solution as the medium for absorbing the cyanogen from the gas, the ferro-cyanid is the usual form of recovery.

Until recently there have been few gas works or coke oven plants recovering cyanids from their gas in this country. Late developments indicate that several new plants are about to begin operations, however.

The normal price of prussiate of potash before the war was 9 and 10 cents a pound; owing to war conditions, the present price is about 60 cents.

Estimating the cyanogen in the gas at one pound per net ton of coal carbonized, equivalent to about 2.6 pounds of yellow prussiate of potash, the output of a modern plant of 80 by-product ovens would be about 3,000 pounds of prussiate per day or 1,000,000 pounds per year.

The accompanying figures of production and imports, Table III, indicate that, up to the outbreak of the war, consumption had decreased, if anything.

Both ferro-cyanids are used for the manufacture of the ferri-cyanids or red prussiates, and in the manufacture of colors, more particularly prussian blue, in case-hardening iron, and when purified, in photography and as chemical reagents. It is possible to transform potassium or sodium ferro-cyanid into the simple potassium or sodium cyanid, used in the extraction of gold from the low grade ores, but so far as is known it is no longer carried on commercially.

Although the by-product oven is now the most important source of coal tar, and as we have already stated the broader development of the tar industry awaited the advent of by-product coking, it is important to record that a very substantial industry had arisen, having gas works tar as its raw material and having roofing materials as its principal products. The coal tar industry in the United States has passed through two stages and is now entering upon a third epoch.

In the first stage, from 1857 when tar was first distilled at Buffalo by Samuel Warren, until about the beginning of the present century, tar distilling necessarily followed rule of thumb methods and progressed in volume of material handled rather in improvement of processes or development of new products and new markets. Great credit is due the pioneers in the industry for building up during this period a substantial business, particularly in the line of roofing material. They laid the foundations and at the same time outstripped in methods and in volume of business the roofing branch of the tar industry in all European countries. It is also important to note that during this epoch, in the year 1887, the H. W. Jayne Chemical Co., Philadelphia, was established for the production of naphthalene, refined carbolic acid, benzol and nitro-benzol. This was the beginning of the plant that in 1896 became the chemical department of the Barrett Co.

The second stage of the industry, comprising roughly the first decade of this century, was a period of engineering development attended by such progress along chemical lines as was necessary to the working out of largely increased production on the one hand, and more exacting demands from consumers, on the other hand. The technical specification, as applied to paving, roofing and waterproofing materials, to creosote oil, to crude as well as to refined products, became an important factor. Laboratory control of products was inaugurated, requiring in many instances the working out of new methods for testing and analysis. In 1900 the Barrett Co. had, outside the chemical department, perhaps four or five chemists in its employ. In 1915 it had over 50. It is not necessary to inform the makers of iron and steel products that during this decade and a half, large producers have had to spend much time and money in co-operative work on standards for methods and materials. The tar industry has been no excep-

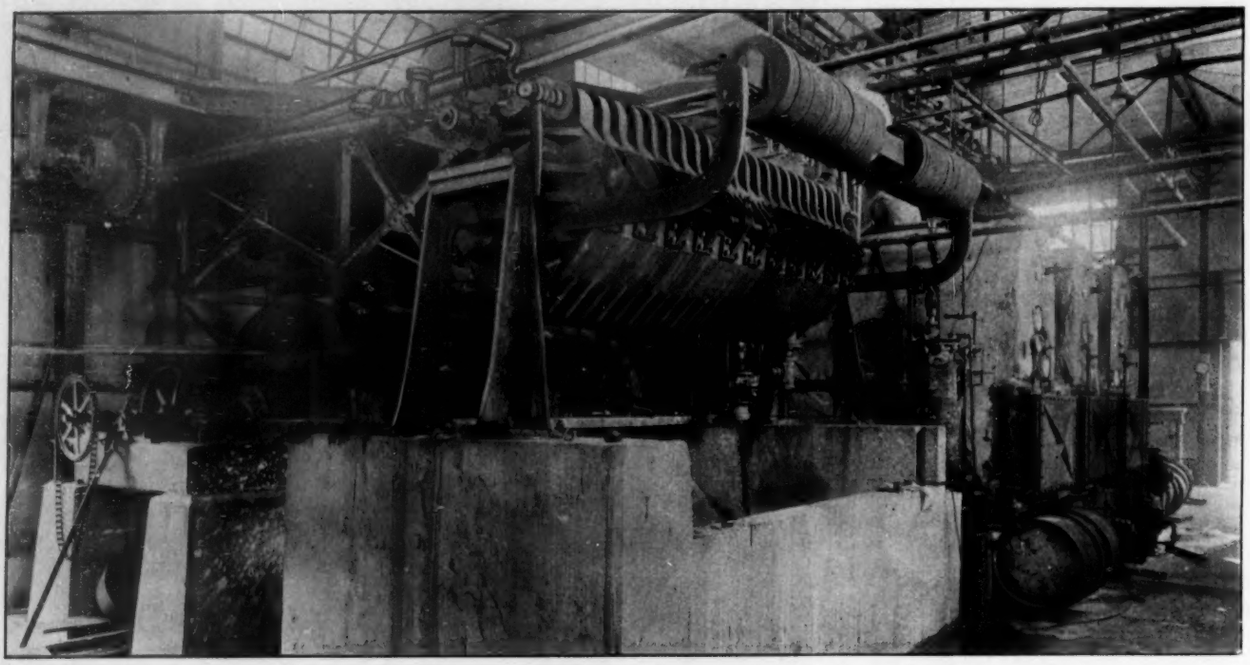


FIG. 3—A FILTER PRESS IN A PHENOL PLANT

tion, and representatives of the Barrett Co. are serving on committees in many scientific and technical societies. During this second stage, development of refined chemical products progressed to such extent as any demand or encouragement for these products existed, and one important product, aniline oil, was established successfully in the face of unfair German competition.

Coal Derivatives in Demand

We are now entering into the third stage of development. The searchlight of newspaper and popular magazine attention has been thrown upon coal tar, although it must be said that this naturally dark subject has not been highly illumined by the rays from that quarter. Coal tar began to be regarded as a sort of Aladdin's lamp, and for many months it was no uncommon thing to receive inquiries for 50,000 gallons of tar a day from respectable and previously conservative manufacturers of cast iron pipe, sewing machines or porcelain bathtubs, who contemplated going into toluol at $4.50 per gallon as a profitable sideline. The tremendous demand for certain coal derivatives, notably benzol, toluol and phenol for the production of explosives, and the effect of this demand on the erection of benzol recovery plants at existing coke oven plants, has already been referred to.

Less tangible and less sharply defined, but not less insistent and perhaps even more significant in its relation to the future of the tar industry, is the demand for "intermediates" for the production of synthetic dyes and drugs. In this direction, some substantial progress has already been made and much research work is now in progress.

What will be the future of the synthetic dyestuff industry in the United States? This question cannot be answered today, but a few observations may be set down.

The manufacture of a limited number of coal-tar colors on a very considerable scale is today in progress. Most of these dyes are produced by companies already engaged in the business before the European war commenced. There can be no doubt that these established companies will continue to produce dyes on a larger scale than before, and their requirements for intermediate products, heretofore imported from Germany, will be met by American tar distillers. Many new concerns are starting to make dyes. Some no doubt fail, and others may continue. To make the United States independent of European dyes there must be a reasonable measure of tariff protection, including an anti-dumping provision and a comprehensive scheme for co-operative efforts on the part of the manufacturers. In other words, we cannot, without pulling together, hope to surpass the compact organization existing in Germany. It must be remembered that Germany's great success in coal tar dyes did not come when she was able to supply her entire home consumption, but when she was able to dominate the world's markets.

Even assuming the greatest possible success in the establishment of permanent chemical industries based on coal-tar derivatives, the importance of this from the standpoint of the tar distiller is greatly over-estimated by all but those having full knowledge of the situation. The portion of tar that can be used in making synthetic dyes and chemicals is only 10 per cent of its whole composition. I cannot over-emphasize the fact that the continued growth of the tar industry, and its ability to take care of the largely increased supplies that are already in sight, depends entirely upon the disposal, at profitable returns, of pitch and creosote oil, the two principal items that constitute the great bulk of the product of tar distillation.

In attempting a brief outline of the tar industry as now practiced in this country, it is necessary at the outset to refer to the several kinds of coal tar with which the distillers have to deal. The total United States production of coal tar in 1915 was approximately 180,000,000 gallons, of which 140,000,000 was from by-product ovens and 40,000,000 from gas works. The production of gas works tar has not materially increased during recent years, on account of the popularity of water gas. The latter has perhaps reached or passed its zenith, and the vertical retort is coming into favor. We have, therefore, tar from horizontal gas retorts, which may be expected to gradually diminish in quantity; tar from by-product ovens, which it is estimated will reach 250,000,000 gallons in 1917; and a much smaller but gradually increasing amount of vertical retort tar.

Classification of Tars

These three kinds of tar differ widely in characteristics. The difference may be roughly expressed by saying that horizontal or old-fashioned gas works tar is the heaviest, most viscous and contains a lower percentage of oils and more pitch. It also contains the highest percentage of suspended or free carbon—the portion or tar insoluble in benzol. Coke oven tar occupies an intermediate position. It is usually lighter and contains more oils and less pitch than horizontal gas works tar. Its free carbon content is lower. Vertical retort gas works tar is lighter, less viscous and contains more oils and less pitch than coke oven tar, and is also lower in suspended carbon. These tars differ also in chemical constituents as well as in physical characteristics. All contain benzol and its homologues, phenols and cresols, napthalene, anthracence and bases of the pyridine type, but in widely varying degree.

Wide variation in physical and chemical composition also occurs between tars produced in different types of coke ovens; and in any given type of oven or retort a change in the time or temperature of coking is reflected by changes in the character of the tar. In fact, the composition and properties of tar depend as much upon conditions of carbonization as upon the kind of coal from which it is derived.

The quality of tar may never be the controling factor in deciding the type of oven or gas retort, or even in determining the heats and time of coking; nevertheless, some consideration of this phase may be worthy of the attention of coke-oven operators.

(To be concluded next week.)

Table III

Ferro-Cyanids of Potassium and Sodium

YELLOW PRUSSIATES OF POTASH AND SODA

Year	U. S. Production Pounds	U. S. Production Value	U. S. Imports Pounds	U. S. Imports Value
1899	6,140,406	$993,514	1,809,089	$204,974*
1900	6,165,407	994,014	1,771,394	224,274*
1903	.....	.....	2,263,219	189,601
1904	5,027,264	683,277	3,592,146	292,874
1907	.....	.....	3,602,202	324,254
1908	.....	.....	2,535,073	217,719
1909	3,510,208	463,983	3,716,445	302,624
1910	.....	.....	3,630,711	306,591
1911	.....	.....	2,973,974	247,555
1912	.....	.....	3,719,105	293,949
1913	.....	.....	4,699,777	427,777
1914	.....	.....	5,373,937	531,154

*Sodium Ferro-cyanide not reported.

Electric Furnaces in Steelmaking

A REVIEW of the development of the electric steel industry in the United States dating from the time the first heat was poured up to the present. The principal types of furnaces are discussed and the quality of the electric product is compared with that of the open-hearth, converter and crucible processes

BY DR. JOHN A. MATHEWS

IT MAY be a surprise to many to learn how nearly the commercial introduction of electric steel coincides with the beginning of the twentieth century. Dr. H. Goldschmidt is my authority for stating that on Dec. 28, 1900, the first carload of electric steel was delivered by Heroult to Messrs. Schneider & Co., Creusot, France. The shipment consisted of nearly 9,000 kilos of steel bars.

In the last years of the nineteenth century much experimenting with electric furnaces was going on and many processes were perfected and patented all over the industrial world. Sales of the product may have been made earlier than the one recorded, either by Heroult or the other inventors, but they have not been made a matter of public record. Kjellin's furnace at Gysinge was first operated in March, 1900, while Captain Stassano, Girod, Harmet, Keller and others were very active during the closing years of the nineteenth century.

Sir William Siemens, Pioneer

Electro-metallurgy may be said to date from Sir William Siemens' experiments. He constructed and operated an arc furnace and patented it in 1878. In this furnace he melted iron, steel and other metals, and his remarks before the Society of Telegraph Engineers in 1880 are truly prophetic and are worth recalling because we have of late seen his prophecy fulfilled. After some theoretical consideration of the power required to melt steel and a comparison of the same with the very expensive coke melting furnaces used in Sheffield, which require from two and one-half to three tons of coke per ton of product, he concluded that the electric furnace may be, therefore, considered as being more economical than the ordinary air furnace and would, barring some incidental losses not included in the calculation, be, as regards economy of fuel, nearly equal to the regenerative gas furnace. The advantages in its favor, however, are that the degree of temperature is theoretically unlimited; that fusion is effected in a perfectly neutral atmosphere; that the operation can be carried on in a laboratory without much preparation, and under the eye of the operator; and, finally, that the limit of heat practically attainable with the use of ordinary refractory materials is very high, because in the electric furnace the fusing material is at a higher temperature than the crucible, whereas in ordinary fusion the temperature of the crucible exceeds that of the material fused within it.

Slow Development of Electro-Metallurgy

Notwithstanding Siemens' words, electro-metallurgy did not develop along iron and steel lines, but progress was made in other branches of the art, and to this pioneer work Americans have contributed richly. We need only recall the work of the Cowles brothers in 1885 and Hall in 1886 on aluminum. Colby invented the electric induction furnace in 1887; Acheson produced carborundum in 1893 and artificial graphite in 1895; Willson in 1893 produced calcium carbide; and the manufacture of ferro-alloys, especially of silicon and chromium, early received attention in the United States.

European engineers were working along similar lines to those that engaged the American workers from 1885. The rapid rise and decline of the carbide industry in Europe had something to do with directing the attention of European inventors to the problem of utilizing existing hydro-electric plants no longer needed for carbide manufacture. Smelting and refining of ores and alloys followed, and France, Italy and Sweden produced a group of inventors whose brilliant achievements have merited recognition from the whole iron and steel trade. To Germany and Austria belongs the credit of having first adopted commercially the inventions of others; and to the United States belongs the somewhat doubtful honor of having overtaken and passed all other nations in the introduction of electric steel furnaces. England has been particularly backward in introducing electric furnaces to replace her very expensive crucible steel process, although rapid changes have taken place there within the past two years. It seems as though the enthusiastic claims of the inventors and their representatives in the early days had injured their cause in England, and their conservatism in adopting electric methods seems to be reflected in the remark of Sir Robert Hadfield, made some ten years ago, that "unfortunately there seems to be fixed in the minds of some of those exploiting such processes the idea that all steel now made is radically of bad quality."

In sharp contrast with the initial backwardness of both England and the United States is the example of our northern neighbor. The Canadian government early recognized the possibilities of electric smelting, and as early as 1903, under instructions from the minister of the interior, Dr. Eugene Haanel, organized the commission which investigated the state of the art in Europe, and made its valuable report in 1904. The work of the commission was followed up in Canada by direct experiments upon smelting many of the native ores.

The American Pioneer

The Halcomb Steel Co. first made electric steel on a commercial scale in the western hemisphere, and has just entered the second decade of electric steel production. To be exact, the company's furnace was first operated on April 5, 1906, and at the beginning of the second decade the original furnace is still in operation, while a 3-ton Snyder furnace, a purely American type, was installed during 1915, and a 6-ton heroult furnace is now being erected.

Five years after the installation was made by the Halcomb Steel Co. there were only three other furnaces in the United States in steel works. The second installation was at the Firth-Sterling Steel Co., and the third and fourth were by the Illinois Steel Co. and by the American Steel & Wire Co. at Worcester. The last two furnaces were of 15 tons capacity and, at the time, were the largest that had been built. Furnaces of 20 to 30 tons capacity have now been built.

In the earliest types of furnaces almost every system of utilizing the electric current for heating was em-

Delivered at the New York meeting of the American Iron and Steel Institute, May 26-27, 1916. The author, John A. Mathews is president of the Halcomb Steel Co., Syracuse, N. Y.

ployed, and no strictly new types have been developed since, although many mechanical and electrical modifications have been made. Many of these bear new names although they do not constitute radically new processes. The types electrically considered are:

Pure arc furnaces, illustrated by the stassano and Rennerfelt processes; arc-resistance furnaces, illustrated by the heroult and the later Girod, Gronwall and Snyder types; pure resistance furnaces, such as the Keller, Harmet and heroult pig iron furnaces, by the Gin process and the earlier Girod crucible furnace, and induction furnaces, such as the Kjellin-Colby and its later modification, the Roechling-Rodenhauser type.

Metallurgically considered, electric furnaces have been used in the iron industry for making pig iron, for making steel direct from the ore, for refining steel previously made in the open hearth or bessemer converter, for making steel by melting cold scrap with or without the use of pig or ore, for manufacturing ferro-alloys, for melting ferro-alloys to be used as additions, and for melting pig iron for malleable castings.

Comparison of Processes Difficult

Many of the various processes that have been developed are commercially successful, but there are so many variables entering into the matter that they cannot be fairly compared, except, perhaps, in one or more particulars. For example, the current consumption can be readily compared, and much is heard about this or that furnace showing low current consumption per ton. Unless furnaces compared are operating under similar conditions and on a similar product, the figures are quite valueless. In melting a similar quality, one furnace may take more current than another simply because the melter kills his steel more perfectly. A few extra kilowatts makes the difference between well and poorly made steel.

Beside current consumption, other variables are life of roofs, bottoms, side-walls and electrodes. First cost of furnaces and quality of construction, and, from the power-house point of view, simplicity and cost of electrical equipment, must be considered, and this involves questions of phases, frequency, voltage and power factor. When all elements are considered, together with ease of operation, it is no simple matter to give off-hand judgment as to what furnace to use.

The time has passed when the electric current itself is supposed to confer any mysterious benefits upon the product, but its function is just as stated by Siemens 35 years ago, namely, to "effect such reactions and decompositions as require for their accomplishment an intense degree of heat, coupled with freedom from such disturbing influences as are inseparable from a furnace worked by the combustion of carbonaceous materials."

Various claims, however, are made for processes depending upon whether the current passes through the bath horizontally or vertically or is merely radiated upon the surface. Mixing or circulation in the bath is supposed to be especially facilitated by whichever process the speaker happens to be interested in. At the temperatures involved, molecular mobility is very great, and solution and diffusion take place satisfactorily if only the total heat available is sufficient to maintain the entire contents of the bath perfectly fluid.

The condition for perfect melting described by Siemens has best been met for 160 years by the crucible process, which has been held in highest esteem where quality is considered. Crucible steel production after a century of supremacy, was given a setback for ordinary uses by the invention of bessemer steel, and a little later the crucible industry was again assailed by the Siemens-Martin product, particularly after the advent of the basic process. Neither of these processes gives a product that competes with crucible steel where highest quality is demanded, and the venerable crucible process thrives notwithstanding these earlier rivals.

Electric and Crucible Results Compared

With the advent of electric furnaces we have a rival which claims to make steel equal to the best crucible steel. It is interesting to note that the inventors recognized the superior character of the crucible product frankly.

When it is said that the electric furnace can produce steel equal to crucible steel, it is meant that conditions in the furnace are such that the metal in the ladle, ready to pour, is in approximately the same condition as well-melted crucible steel. The quality of the finished product, however, depends upon the use of equally good methods of handling the ingot in cogging, rolling, annealing and inspecting that are customary in handling fine tool steel.

The point is that each process has its particular field, and while some crucible tonnage may be diverted to electric steel, yet it is more likely that electric steel will find its market in the most exacting requirements of steel for structural and tensile purposes, such as have come about almost simultaneously with the processes themselves, namely, for automobile and aeroplane parts. Crucible steels for these purposes are scarcely commercial because of the difficulties attendant upon making very low or medium carbon-alloy steels by that method, and the tonnage demand is far beyond what could be met by crucible steels.

Electric Process Requires Skill

The pioneer work that has been done introducing electric steels into this country has had the effect of creating new standards of value for alloy products, and, indirectly, has brought about a general improvement in the quality of open hearth steels upon the part of mills specializing in these products. Of this there can be no doubt.

The recent activity of electric furnace installations calls for some comment and caution. It is noticeable that many of these are going into plants not formerly engaged in steelmaking at all, and this, in conjunction with the hesitancy of established plants to adopt electric melting, leads one to look for a reason. It is in part due to the activity of power companies in looking for desirable business; but while the electric furnace load is generally desirable, it can only remain so if the plants of the users are successful. On the part of those who have recently made these installations, there may be some misapprehension as to just what an electric furnace will do. It is not an automatic machine guaranteed to produce steel of crucible quality by merely throwing on a switch. It requires at least as much skill as any other existing process, and the number of those possessing this skill is limited. Undoubtedly we will pass through a period of reaction and dissatisfaction with electric products while many of the new furnaces are in the experimental stage.

Adaptability of Electric Processes

To one who has been interested in electric steel from its earliest days, it is interesting to observe the change in attitude toward the actual carrying out of the processes and the feasibility of establishing them in widely scattered districts. It was formerly thought that it would be impracticable to utilize electrical energy to do the original melting, that only in most-favored localities could these processes be operated at all, and then only for making the highest-grade products. In accordance with the prevailing idea, the initial installation at the Halcomb plant consisted of a single-phase 4-ton electric furnace fed by a 20-ton Wellman-Sea-

ver tilting basic open-hearth furnace. At that time four tons was as large a furnace as had been made, and nothing but single-phase current had been used. The initial installation of Richard Lindenberg, in Germany, was practically identical and started operating at almost the same time. The current was used for refining only, and the Halcomb furnace was not suitable for cold melting, although a few heats have been so made. One of these is of peculiar historic interest because the charge consisted of electric pig iron, made in the Canadian experiments under the direction of Dr. Haanel. The particular pig iron used was made from roasted pyrrhotite ores and was described by Dr. Haanel in 1906 in the preliminary report on the smelting of Canadian iron ores by the electro-thermic process. Some of this material was later smelted in March, 1909, under the supervision of Mr. Ernest Humbert, who furnished the following analyses of the iron used:

Ni.	Cu.	Si.	S.	P.
4.35	.72	2.95	.020	.030
3.13	.80	2.31	.013	.023
4.15	.82	2.39	.012	.027

The heat made from this iron gave the following analysis and represents the first steel made in the western hemisphere direct from the ore in two operations, both of which employed electric furnaces of the heroult type: Carbon, 0.44; silicon, 0.034; manganese, 0.50; phosphorus, 0.013; sulphur, 0.013; nickel, 3.62; and copper, 0.48.

The high copper content led us to test this heat very thoroughly. The physical characteristics were very good and showed no harmful effects of the copper present.

Of the later installations of electric furnaces, probably one-half are intended to melt and refine cold charges, even in localities not especially favored as regards power rates. However, there has been a very general decrease in wholesale power rates during the last few years, and this applies to steam as well as hydroelectric sources of power. Rates below one cent per kilowatt may be had in very many localities for large quantities of power steadily used.

Changes in Electrical Equipment

The most marked change in the electrical equipment of furnaces consists in the larger quantity of power deemed necessary for a given size of furnace. In the original furnace of the Halcomb plant 550 kilovolt-amperes were used for a 4-ton furnace. Today the United States Steel Corporation recommends 900 kilovolt-amperes for a furnace of this size. Some of the older 6-ton furnaces have from 900 to 1,000 kilovolt-amperes available; 1,200 kilovolt-amperes is now standard, and one furnace is to have 1,500 kilovolt-amperes. The Snyder furnace has 800 kilovolt-amperes available for a 3-ton furnace, and the heroult furnaces, as installed in this country, are now equipped with 750 kilovolt-amperes for this capacity. It has been found that increased power during the melting-down stage is very desirable and brings about a saving in total kilowatts expended. After the melting is complete excessive power is detrimental to the heat itself and very destructive of roofs and linings.

It is possible to make electric steel chemically purer than by any other process. Phosphorus from the electric department of the Halcomb Steel Co. rarely exceeds 0.010 per cent, and sulphur in carbon heats will average still lower, while in alloy heats the sulphur rarely exceeds 0.015 per cent. This is true of both the heroult and Snyder product; in fact, there have been instances of eight consecutive heats showing sulphur and phosphorus below 0.010 per cent. In the case of sulphur this of itself is not so important but is an indication of the success in attaining a reducing and deoxidizing condition during the operation. In the case of both low and high carbon heats of a great variety of compositions, many ingots have been split in two and a cavity or blow-hole even so large as a pinhead has never been found. This is no positive guarantee that unsound ingots may not result even with electric steel, and the approved methods of pipe prevention must be employed, together with every possible care in melting and pouring. Even with the use of all these precautions, the same results cannot always be obtained in open-hearth and bessemer steel, owing to the oxidizing conditions of operation.

This shows how timely was the invention and development of electrical processes simultaneously with the advent of the automobile and aeroplane. New requirements for materials of construction came into being along with them, and it is in meeting these requirements the electric furnace finds its best application. In the construction of automobiles and aeroplanes, it is little short of criminal to use any materials but the best when human life is at stake and when safety cannot be had by merely increasing the weight of vital parts.

An advantage of the electric product scarcely anticipated by Siemens is the ability to control the composition within narrower limits than are possible in open-hearth practice. This is especially noticeable in the use of the more easily oxidizable metals, such as silicon, manganese, chromium and vanadium. This is an advantage in several ways. Less excess alloy needs to be added to the heat to insure the proper amount in the finished steel, and the quantity of solid metallic oxides in the steel, or to be eliminated from the steel, is thereby reduced. Moreover, the more nearly composition can be controled the more certain will be the results of heat treatment.

Both the maker and the user of the steel are the gainers by reason of the above characteristics, as well as by the fact that all alloy additions may be made in the furnace itself rather than in the ladle, thereby removing danger from lack of homogeneity.

In 1910 there were 10 electric furnaces in the United States and 104 elsewhere in the world. In 1913, 19 against 121; in 1915, 41 against 172; while at present there are no less than 100 either operating or under construction as against probably 250 elsewhere.

America Will Lead

The furnaces already installed in this country, or now being built, represent the utilization of between 125,000 and 135,000 electrical horsepower and will be capable of a tonnage output of between 1,000,000 and 1,100,000 tons of ingots or castings per annum. The heroult system represents at least 70 per cent of this electrical energy and tonnage output.

The recent announcement of electric furnace development in the plants of the United States Steel Corporation is deserving of especial mention here because of the magnitude of the installations. At the Duquesne works of the Carnegie Steel Co., a 20-ton heroult furnace is now under construction, which will operate on liquid open-hearth metal from any of their 32 open-hearth furnaces at that plant. It is estimated this furnace will produce about 200 tons of ingots per day of 24 hours.

At the South Chicago works of the Illinois Steel Co., where a 15-ton furnace has been in operation for several years, three additional electric furnaces, two of 20 tons and one of 15 tons capacity, are now under construction. These furnaces will receive liquid open hearth metal from the duplex plant, consisting of three 200-ton rolling open-hearth furnaces and two 25-ton bessemer converters, which are also under construction at these works. This installation, when completed, it is estimated will produce 800 tons of

electric steel ingots per day and will represent by far the largest electric furnace installation in the word. The details of this will doubtless be made the subject of a separate communication from those most intimately associated with this recent development. If preparation ever becomes a reality, the United States shall not have to apologize for quality in comparison with any industrial or warring rival—at least so far as the product of privately owned plants is concerned; and, in the tonnage capacity of electric furnaces installed, we now take first place among steelmaking nations, as we also do in bessemer, open hearth and crucible steel production.

Operating Cost is Important Factor

BY CARL H. BOOTH

IN DISCUSSING electric furnaces it has always been held that any type of furnace, properly designed and constructed, if operated with sufficient metallurgical skill, can be used to make the highest grade of steel. Dr. Mathews has developed this thought with special emphasis upon the necessity of having skilled handling, which is a matter of first importance. Many electric furnaces have been condemned because of improper handling on the part of operators.

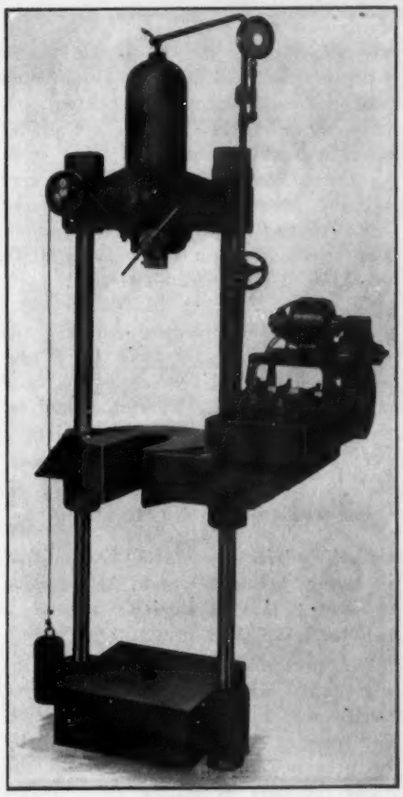
Operating Cost Is Important

But in the last analysis, the question of the cost of operation is equally important. This is especially true if the electric furnace is to have any wide application in the manufacture of the common grades of steel, which at present are made by the bessemer and open hearth processes. It is also equally important to have low cost of operation if electric furnaces are to stay in the business when the manufacture of steel again returns to a normal basis, and when the net profit made is frequently measured by a dollar a ton.

To secure high efficiency and low cost operation, it is believed that furnaces should be built of relatively small holding capacity, should be high powered, and should use but one electrode. This results in a furnace of high thermal efficiency, of low electrode consumption, and with a low operation cost.

Dr. Mathews comments on the changed attitude towards using electrical energy to do the original melting. Snyder furnaces, melting and refining cold material on a basic bottom, are making from six to 12 heats in 24 hours, depending on the grade of steel made and the methods used for handling the metal. It is not at all uncommon to melt down an entire charge of cold scrap in one hour and a half.

The quick melting ability of an electric furnace tends to make unnecessary and expensive the use of other furnaces, such as the open hearth or bessemer, either to do the preliminary melting, or a part of the refining. Possibly the developments of the future will be in the direction of doing all work in the electric furnace, except in cases where hot blast furnace or mixer metal is available as raw material, for direct use.



VERTICAL 100-TON HYDRAULIC FORCING PRESS MANUFACTURED BY THE HYDRAULIC PRESS MFG. CO.

Dr. Mathews has also pointed out that the electric method has an advantage due to its neutral atmosphere, and to its ability to make steel of exceptional chemical purity. It is quite evident that if the entire steelmaking operation is carried on in the electric furnace, few deoxidizing and alloy additions will be required for cleaning the steel and removing oxides, nitrides and occluded gases.

An electric furnace of approximately 12 tons holding capacity is now being designed. It is designed for a daily output of 100 tons of steel, melting and refining cold scrap on a basic bottom. It is thought that the steel made will have an analysis equal to the best low carbon, open hearth steel, and it is expected that the operating cost will be low enough to compare favorably with an open hearth furnace having a daily output of 100 tons.

A discussion of Dr. John A. Mathew's paper, "The Electric Furnace in Steel Manufacture," delivered at the New York meeting of the American Iron and Steel Institute. Mr. Booth is treasurer, Snyder Electric Furnace Co., Chicago.

A Motor-Driven Hydraulic Forcing Press

A 100-ton vertical press of unusual construction has been developed by the Hydraulic Press Mfg. Co., Mount Gilead, O. The press was especially designed for forcing piston heads on and off piston rods, but is adapted to a wide range of miscellaneous forcing work.

As shown in the accompanying illustration, the machine consists of a heavy base, two vertical strain rods, an upper base upon which the pressure pump is mounted and the head, in which the ram operates. In most installations the press is set so that the upper base is level with the floor. The upper part of the press is designed for a pressure of 100 tons, and the lower part is constructed to withstand a maximum pressure of 50 tons. The ram is 10 inches in diameter and has a run of 22 inches. It has a rack and pinion attachment to raise and lower it upon the work. The pressure is furnished by a horizontal double-plunger pump driven by a motor through double reduction gears. A tee screw hydraulic operating valve controls the pressure from the pump to the press cylinder. The strain rods are made of 4-inch cold-rolled steel shafting and the principal castings are steel.

For locomotive piston work, the head is placed on the lower base, with the rod protruding through the upper base. The ram is brought down upon the upper end of the rod, pressure is applied and the rod is forced into the head. To remove the rod, the head is placed on the upper base with the rod hanging down through the opening. Pressure is applied to the rod, and it is forced out of the head. The slot in the upper base makes the machine suitable for heavy arbor and broaching work.

WHAT'S WHAT and WHY

Don't Ask Yourself-Ask Us!

Questions from our Readers answered by Experts

Number of Furnaces Owned by Steel Corporation

Can you give us the total number of blast furnaces and open hearth furnaces owned and operated by the United States Steel Corporation? Which of the various subsidiary companies controls the most pig iron and steel making capacity?

On Dec. 31, 1915, United States Steel Corporation owned and operated 127 blast furnaces and 312 open hearth steel furnaces. Of this total, the Carnegie Steel Co., Pittsburgh, controlled by far the largest number, operating 51 blast furnaces and 132 open hearth furnaces. The Illinois Steel Co., Chicago, operates 19 blast furnaces and 28 open hearth furnaces; the Indiana Steel Co., Gary, Ind., operates eight blast furnaces and 43 open hearth furnaces. The Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., controls 16 blast furnaces and nine open hearth furnaces.

Arsenic in Steel Castings

What is the effect of arsenic in steel castings? Do United States navy specifications for such castings contain any provisions referring to arsenic and copper?

Arsenic, when less than 0.17 per cent, shows no effect on steel. The claim is made that it raises the tensile strength and decreases the ductility of steel if 0.17 per cent or greater is contained.

Arsenic is never present in commercial steels in sufficient quantity to materially affect the physical properties, and it is never limited in the United States navy specifications. The presence of copper is not considered objectionable, and when properly alloyed, it increases the toughness and general physical characteristics of steel.

The specifications for steel castings for the United States navy refer especially to the percentages of sulphur and phosphorus, the minimum tensile strength and yield point, the minimum elongation and reduction of area, and the cold bending test. In the six grades of castings called for the sulphur must not exceed from 0.05 to 0.07 per cent and the phosphorus must not exceed from 0.05 to 0.06 per cent. The minimum tensile strength varies from 60,000 to 85,000. The minimum yield point varies from 27,600 to 53,000, the elongation from 17 to 22 per cent and the reduction of area from 20 to 30 per cent. For the cold bending test, a bend of from 90 to 120 degrees around an inner diameter of 1 inch is required.

To Lessen Fire Risk

Kindly advise us as to the best method of caring for used waste, oily wiping rags, etc., that accumulate around a manufacturing plant.

The presence of such materials as oily rags, waste, etc., or sawdust, constitutes a considerable fire risk. The danger is greatly increased by the presence of any red lead on the waste, as this promotes spontaneous combustion. The following is an actual case: A plumber left in his coat pocket a handful of oily waste streaked with red lead, which he had used in cleaning off pipe fittings. A few days later, on drawing his coat from a warm closet where he had left it hanging, the pocket containing the waste burst into flames.

Oily waste and rags should be collected frequently and regularly and stored temporarily in fireproof containers before washing out in hot water and soda. Heavy galvanized steel barrels mounted on legs form good receptacles. The barrels should be riveted together, not soldered, and have heavy tight-fitting metal lids. This type of barrel would protect the building even if the contents should take fire.

Price of Armor Plate

What prompted armor plate manufacturers to offer to reduce the price of their material if the government did not enter into the business of making armor plate? In some quarters, the position taken by the manufacturers has been construed as being an admission that they have charged the government excessive prices in the past.

The armor manufacturers offered to reduce the price for armor plate that will be required for the proposed five-year naval program simply because contracts covering that period would assure continuous performance, thus eliminating tremendous overhead charges to which makers have been subjected heretofore, tonnages awarded having provided for the operation of plants upon a basis greatly below plant capacity. In the case of the Bethlehem plant, awards called for only one-third capacity. It is not strange that the offer of the manufacturers to reduce prices has been misconstrued and interpreted as meaning exorbitant prices have been charged in the past. The propaganda that has been operated in opposition to the manufacturers has purposely given a false impression as to profits and is utterly refuted by testimony given before the house and senate committees on naval affairs recently.

Bounties for Pig Iron

We understand that the Australian government pays bounties to manufacturers of pig iron. Will you kindly advise us if this is correct?

The Australian iron bounty act, assented to Nov. 15, 1915, provides that a bounty shall be paid on all pig iron manufactured in the commonwealth for foundry purposes. The act also states that not more than £60,000, or $300,000, shall be expended in such bounties this year. The maximum sum payable under the act of 1914 was £30,000, or $150,000 per year.

Handling the Blast Furnace Charge

IN THIS, the second installment, Mr. Vreeland outlines the various designs of furnace tops which have been introduced to meet the need for good distribution of raw materials—The effect of the introduction of the fine ores of the Mesabi range is described and the resultant changes in furnace practice are outlined

BY GEORGE W. VREELAND

THREE requirements have to be met to secure good distribution: First, proper distribution of the fine and coarse materials in the receiving throat and hopper; second, proper distribution of the materials on the big bell; and third, proper distribution of the materials in the furnace. The first is the keynote of good distribution and presents the greatest difficulties at the present time.

With the use of manual labor on the furnace top, good distribution is easily obtained. In hand filling, the buggies always go to the top in the same sequence. As the top of the furnace is always divided off into an even number of spaces (generally six), each charge can be easily rotated with reference to the charge below by simply advancing the ore buggy one space in the circumference of the hopper. By this method, any irregularities—such as dumping an extra buggy, or the ore overlapping on dumping the last two buggies of an eight-buggy charge—are taken care of after six rounds or charges are lowered into the furnace.

So far as the distribution of raw materials is concerned, hand filling has always been considered very nearly perfect. But to obtain large tonnage output a radical change had to be made, and the high labor cost in hand filling warrants a heavy investment in equipment. The mechanically filled furnace was the natural sequence. The early skip filled furnaces were built without much thought to distribution. The life of the lining was consequently very short and the campaign very troublesome. In many cases the skips were simply placed on old furnaces that had done good work with hand filling. This usually developed a poor working furnace and the skip filling was blamed. Operators and engineers attacked the problem with the result that various designs of furnace tops were brought out.

One of the earliest designs to prevent bad distribution was the Brown rotating top. In this an attempt was made to follow the hand-filling method as closely as possible. This top, as shown in Fig. 4, has a spout *C*, with gas seal *B* in the form of a flap door at the lower end to prevent the escape of the gas when the bell is lowered. The door is operated by the flow of material to the big bell. The receiving hopper *A* and spout *C* rest on ball bearings and are rotated together, either by the operation of the skip car or independently, a predetermined number of degrees, slightly less than 90 degrees. By this method a series of piles are placed around the big bell, each pile representing a skip load.

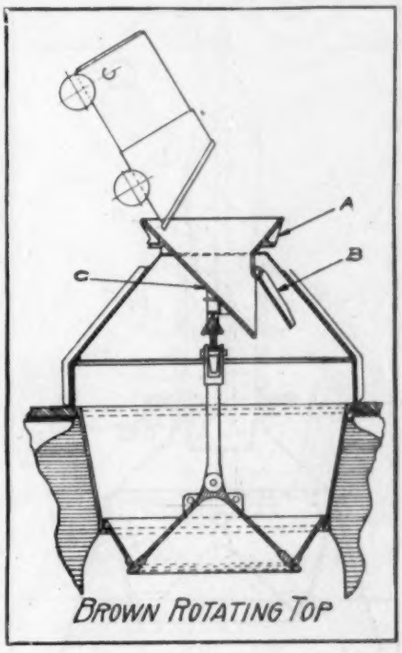


FIG. 4—AN EARLY DESIGN OF FURNACE TOP

One of the objections to this top is the location and form of the material deposited on the large bell, depending on the position of the spout relative to the skip. If the spout is pointing directly opposite the skip incline, the speed of the ore leaving the skip and down the spout will throw the ore considerably further away from the center of the bell than when the spout is pointing directly under the skip. With the spout in the last-named position, a direct reversal of the flow of the ore must take place, with consequently reduced speed, and in an intermediate position we will have the fault varying between these two extremes. Various methods have been tried to overcome this fault, but none has worked out satisfactorily. Although this top approaches the hand filling method, this fundamental trouble has not been removed.

Straight Double-Bell Top

This consists of a receiving hopper into which the skip or skips dump (depending on whether the furnace has a single or a double skip), and a barrel, either straight or slightly tapered, with a small bell fitting it at the lower end. Under the small bell is the large bell closing the top of the furnace. These are the fundamentals of a straight double-bell top; but there are many points that must be kept in view in designing a top of this description, as they all have considerable influence on the final distribution desired. These points are: First, the size and shape of the skip car; second, speed of dumping; third, angle of dumping; fourth, facilities for regulating the dumping position, and maintaining it at an exact point after this has been determined, even with varying loads and ore conditions; fifth, shape of receiving hopper; sixth, dumping close to the center line on both axes, so that the lumps and fines will not segregate to separate points in the barrel; and, seventh, the barrel should be of such diameter (not exceeding 5 feet as a maximum) and of such a length as to hold one full skip of coke.

With these points in view, a top can be built that will do good work; but, as a general proposition, the most successful straight double-bell tops, of which we have numerous examples in this country, are the result of continual alterations and changes over a number of years. The weak points are noted and eliminated as the opportunity affords, until the materials are distributed correctly on the bell. Local conditions will not permit such change in many cases without radical alterations; and often the installation of a rotating top will straighten out a bad distribution

Presented at the New York meeting of the American Iron and Steel Institute, May 26-27. The author, George W. Vreeland, is superintendent of blast furnaces, Carnegie Steel Co., Mingo Junction, O. This is the second of three installments.

and correct errors that cannot be corrected in any other way without complete rebuilding of the top of the furnace and the skip incline.

McKee Revolving Top

The McKee revolving top, shown in Fig. 5, is a well-designed straight, double-bell top, with the additional feature that the barrel is not connected to the receiving hopper, but, with the small bell, rests on ball bearings and is revolved by a train of gears direct-connected to a motor or by cable to a drum with a motor at the bottom of the furnace. The small bell and barrel are revolved around the center line of the furnace, so that any errors of distribution on the small bell can be spread and equalized over the entire circumference.

The method of operating the top varies considerably. Some operators revolve each skip load of a six-skip charge through an angle of 60 degrees with reference to the load immediately preceding. Others deposit a complete charge on the bell from the hopper in its original position and then revolve the top through an angle of 60 degrees before dumping the materials of the succeeding charge. In either case the cycle is completed in six successive movements of the top.

With the highly developed automatic electric control, the rotation of the top in either of the desired cycles is taken out of the skip operator's hand, being operated in connection with the skip. Thus the top must be revolved in the predetermined cycle if the skip is operated.

Baker-Neuman Revolving Top

This top, as shown in Fig. 6, consists of a revolving hopper *A*, with a small bell *C*, on which is attached deflecting plate *B*. The small bell, with the deflecting plate, is revolved 87 degrees and 30 minutes as the bell is raised. This rotation is accomplished by means of a rifle-barrel arrangement at the upper part of the small bell rod.

The skip load is dumped on the large bell with the deflecting plate and bell in the lowered position, the principal function of the small bell being to act as a gas seal when the large bell is lowered. This top has a tendency to put the raw stock in piles, but not as distinctively as the Brown top.

Kennedy Top

This top resembles the McKee top in many particulars, and is rotated by a cylinder on top or by means of ropes attached to driving mechanism at the bottom.

Neeland Top

I have left the discussion of this top until the last because, although it was one of the first tops designed for the mechanical filling of a blast furnace, I regard it as a most excellent filling system. The four original furnaces at Duquesne were for several years the only furnaces in this country equipped with this system.

About 10 years ago the good qualities of this top began to be appreciated and a number of furnaces have since been so equipped, many of them varying somewhat from the original,

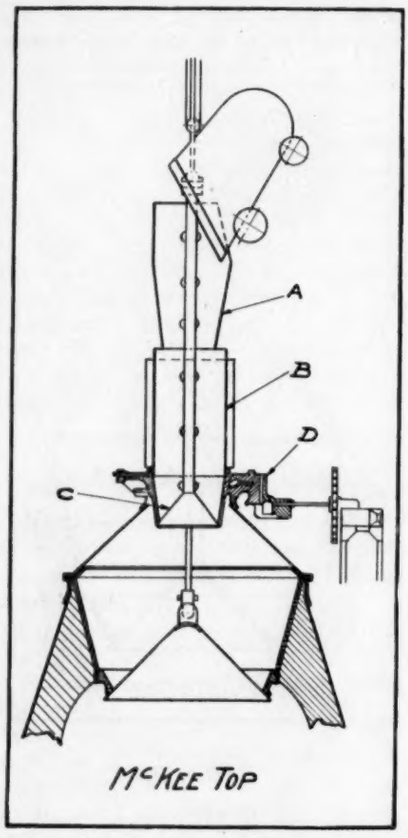


FIG. 5—McKEE REVOLVING FURNACE TOP

but not in principle. The improvements have been due to modern conditions, as it must be remembered that this top is 20 years old.

The Neeland system, illustrated in Fig 7, consists of a cylindrical bucket with a bell in the bottom to which there is attached a stem by means of which the bucket is carried to the top of the furnace and placed on the gas seal. The material in the bucket is deposited on the big bell by lowering the bell in the bottom. After the bucket is emptied the bell is drawn up and then taken down the incline and deposited on the scale car (as originally built), or placed on a turn-table (Forbes-Parkes modification) or held at the bottom permanently attached to the trolley by means of a swivel, as at the Youngstown Sheet & Tube Co.'s furnaces.

It was noticed at Duquesne that as the ore flowed from the chutes into the bucket there was an unequal distribution of the lumps and fines, which resulted in the cutting of the furnace lining at some point. To remedy this, the scale cars were equipped with revolving tables on which the buckets were set and revolved continuously while the ore is flowing, or revolved a certain number of degrees after the bucket is full. By thus revolving the bucket, the lumps and fines are uniformly distributed, as has been shown by many tests.

A further modification of the original scheme is to discharge the charge from the larry car into the bucket as it hangs on the trolley and then rotate the bucket a certain number of degrees. The rotation is accomplished by means of a rack attached to a hydraulic cylinder meshing into a pinion in the stem of the bucket before the bucket goes to the top.

The great advantage of this system is that all the mechanical and electrical devices used to revolve the charge are located at the bottom of the furnace, away from the heat and dust, and are continually under the eye of the operator.

These brief descriptions cover the tops generally used in this country. The selection and design must be left to the furnace management, and they must be governed by the local conditions, with the two main requirements kept in view: First, as nearly perfect distribution of the lumps and fines around the big bell as it is possible to attain (and it is not so important that this equal distribution should obtain with every charge as it is that it shall be attained over a certain number of charges); and second, that continuous operation of the device is essential. No charging apparatus should be installed that will cause numerous and costly delays for repairs and adjustment.

A rotating top is a most desirable refinement, but it is not a cure for all the "ills and ails" to which a blast furnace is subject. It will go far, however, toward ironing out and smoothing over some of the troubles of poor distribution and leave the operator's mind comparatively free to take up other pressing questions which may confront him.

After the small bell has been lowered and the contents deposited on the large bell, no change in circum-

ferential distribution can take place; but the question presents itself as to the quantity of the various materials and the disposition of them vertically on the large bell, also the cycle of lowering the charge into the furnace. There also enters the problem of what might be termed as radial distribution.

A study of the actual charges of raw materials, starting with the drawing of the ore and stone from the bins into the larry cars, dumping them into the skip buggy, then on the small bell, then on the large bell and finally into the furnace, has produced varied and interesting results.

A few years ago it was possible to obtain very good results with a thick stratum of ore and a correspondingly thick stratum of coke; but as the percentage of Mesabi ores increased, their fineness increased also, and the old range ores deteriorated physically or disappeared entirely. Thus we were left with our iron-bearing material forming a dense layer or ring in the furnace and no lumps to afford the freer passage of the ascending gases. That the increase in the physical fineness of the ores has brought about necessary changes in the methods of charging the furnace, as well as changes in the lines, is shown by the records of furnaces made years ago, when the very best old range ores were used with about 30 to 35 per cent of the best Mesabi ores.

From the practice on the Duquesne furnaces in the years 1897-8-9, according to Mr. Diehl's figures given in his discussion of Mr. Brassert's paper on blast furnaces, read before this institute in 1915, we find that these furnaces produced 502 tons of pig iron with 1,979 pounds of coke per ton, with a stove temperature of 948 degrees and a yield of about 60 per cent. The lines of these furnaces were not modern, in that they did not have the large hearth and the steep angle bosh, but that was unnecessary with the grade of materials used. As the percentage of Mesabi increased and the theoretical yield decreased, our furnace practice showed a marked falling off, as is shown in the following table, which is the average of a large number of furnaces in this country using lake ores, taken from Mr. Brassert's paper mentioned above:

Year.	Per cent Mesabi.	Lbs. coke per ton iron.
1902	42.8	2,155
1903	50.3	2,191
1904	55.0	2,239
1905	61.0	2,275
1906	65.2	2,345
1907	68.7	2,365

During the period above mentioned, general improvements in the furnace plants were under way, such as increasing the stove capacity, purifying the gases, steepening the boshes, and many other changes for the better and more regular operation of the furnace. These improvements produced remarkable results in the economical production of pig iron, through greater yield, better coke practice and lower cost, even in the face of theoretical yields averaging considerably lower than that of the ores 10 years earlier.

But, with all the mechanical improvements in the methods of charging, and better preparation and selection of the raw materials, too much importance cannot be given to the question of the actual manner of preparing the charge before it goes into the furnace and to its delivery into the furnace proper.

The large charge of 14,000 to 16,000 pounds of coke and 30,000 to 35,000

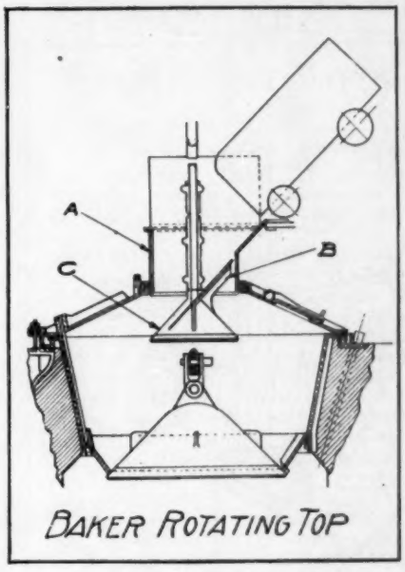


FIG. 6 — BAKER-NEUMAN REVOLVING TOP

pounds of ore, with the corresponding amount of stone, forms thick, heavy layers of each material; and although the coke does not offer much resistance to the gas, the heavy layers of ore, especially that part thrown towards the center of the furnace, prevent the free ascent of the gases. The gases in their ascent, following the path of least resistance, cause imperfect and incomplete reduction of the ores. This condition can be overcome only by direct carbon reduction in the lower part of the furnace.

To remedy this, the charge is often split in two, thereby cutting the layers in half, which gives us a ring of ore of maximum thickness near the walls, tapering off gradually towards the center, where the lumps have a tendency to roll. This method has been demonstrated to be an improvement over the large charge, but a condition may arise wherein we have too much ore close to the walls, and too much coke towards the center. This would cause the center to travel too fast with respect to the materials close to the walls and result in greater loss in flue dust.

With the results for the years 1902 to 1907 before us, during which period the percentage of fine Mesabi ores was on the increase, it is readily seen that our general blast furnace practice was going backward. Many changes were in design, equipment and practice. Among other problems attacked the question of filling received considerable attention. During that period the thick strata of materials were used quite extensively. Practice demands that a certain amount of ore must be deposited close to the furnace wall to prevent too much gas following this path. If the theory is correct that a more intimate mixture of the ore, coke and stone would permit of a better reduction of the ore, because of the more intimate contact of the ore and the gas, due to the more uniform distribution of the gas, then the proposition resolves itself into the adoption of a system whereby we get the requisite amount of ore against the wall, and the remainder of the ore, coke and stone intimately mixed and uniformly distributed over the entire area.

This system of charging was effected by filling and operating the bell as follows—assuming for illustration, a 15,000-pound coke charge:

7,500 pounds coke on large bell—dump same into furnace;
½ stone and ½ ore on large bell—dump same into furnace;
7,500 pounds coke on large bell—dump same into furnace;
½ stone and ½ ore on large bell—dump same into furnace.

The first section gives us a thin layer of coke practically uniform in thickness over the entire area of the furnace, with the ore and stone intimately mixed and deposited close to the walls, some of the lumps rolling towards the center. In the second section, the coke is placed on the large bell and the ore and stone intimately mixed on top of it; and, upon lowering the bell to deposit the charge, it is observed that only a small part of the coke leaves the bell before the ore and stone begin to break through and mix with the coke falling from the large bell into the furnace. As this section lies in the furnace, it is found that we have a very thorough mixture of ore, coke and stone throughout the entire layer.

That this method of filling and distribution in the furnace is satisfactory

is proved by the work of one of our Mingo furnaces for the year 1915:

Average tonnage per day, includes blow-in, tons	534.4
Average coke per ton of pig iron, includes blow-in, tons	1,994
Average loss, includes blow-in, per cent	2.29
Blast temperature, degrees Fahr.	891

The blast temperature of 891 degrees Fahr. is particularly noticeable, it being all the stoves will produce; and when we compare this furnace with other furnaces working similar raw materials with stoves capable of giving an average temperature of 1,200 degrees Fahr., we must give some credit to the filling method described.

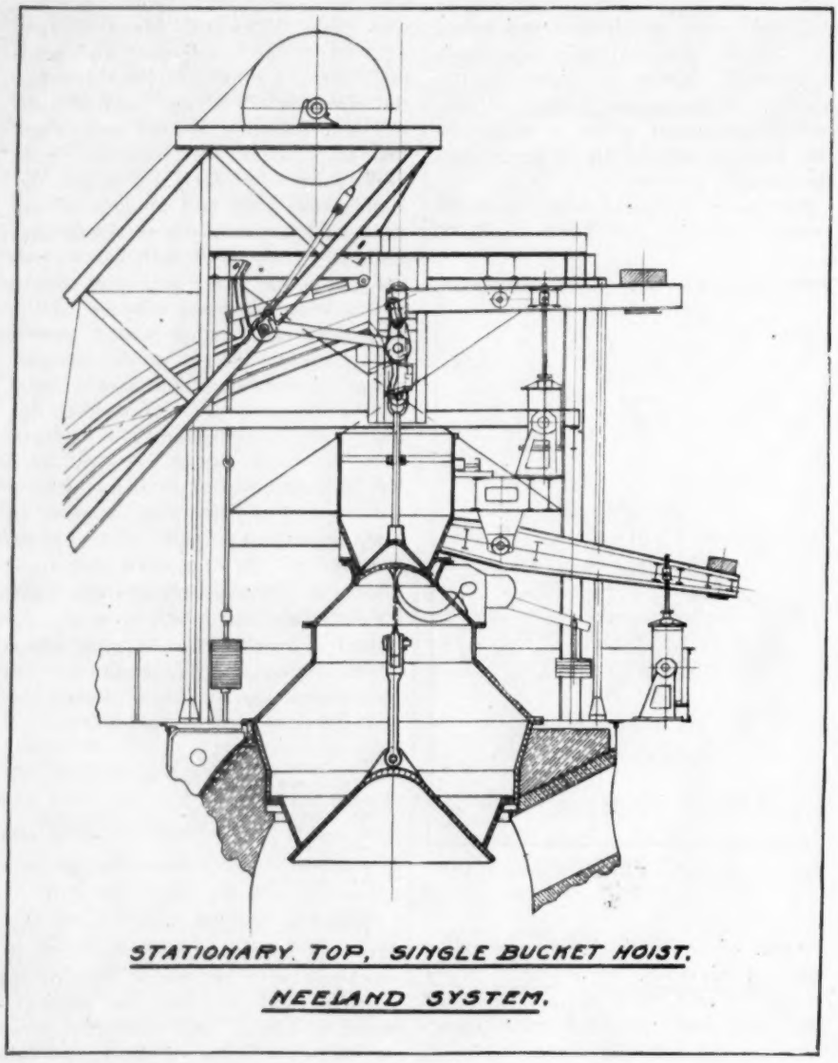


FIG. 7—DETAILS OF NEELAND SYSTEM

A proof that this method of charging is conducive to good results is this: On changing to the thick coke and ore layer, we were unable with the same burden to maintain our hearth temperatures with the heat at our command; and not even in the face of a 10 per cent reduction in the ore burden did the temperature return. On changing the filling back to the other method, the furnace returned to its normal condition as soon as the charge reached the tuyeres. This was done on two separate occasions with the same results.

Many methods of placing the materials on the large bell and depositing them in the furnace are now in use and I have experimented with a large number of them; but the methods described above have given very satisfactory results over a long period of time and may prove of value to other operators under similar conditions, especially where a large percentage of fine ores are used.

(To be concluded next week.)

Japanese Metal Market

Japanese publications have devoted much attention recently to the boom that is being experienced in the metal market. Predictions are made that there will be still greater activity displayed. It is said that the country has never had such a boom before, and that there is unprecedented speculation in metals. Increased rates have greatly benefited the export trade. A movement for organizing a new steel works, with $10,000,000 capital, is reported. The site is likely to be somewhere in Kyushu. It is stated that the new factory will have a very good supply of ore from China, and that by the end of the present year there will be a valuable addition to the steel-producing capacity of the country. Plans for a third extension of the plant of the Government Iron Works at Edamitsu are also reported. It is said that immediately after the completion of the second extension scheme the new plan will be carried out, with a capital of $17,928,000, during five years, with the intention of thus increasing the annual product of the plant by 300,000 tons. It is stated that an arrangement has been made for the purchase of all the machinery required through government agents overseas. A leading daily says that in the present year the production will be raised to 330,000 tons, when the net profit will rise to a point of $3,984,000. Raw ores are imported from China, Chosen, and other continental mines, and the net purchase of domestic ores amounts only to 10,000 tons.

To Increase Production of Ore

A scheme is being contemplated among certain business men for the establishment of a big iron works in Hokkaido. The increase of Japan's capacity for producing iron and steel is regarded as most urgent, because industrial circles have been reduced to an almost helpless condition on the suspension of steel and iron supplies from overseas. Attention is being given to a mine in the vicinity of Kuchian, Hokkaido. It is claimed that it is more than 50 feet deep and contains at least 7,000,000 tons of good ore, enough to feed the new foundry for more than 40 years. The contemplated company will be managed by certain mining operators, with a paid up capital of $2,490,000.

Company to Manufacture Aluminum

The establishment of a joint stock company for the manufacture of aluminum at Kachigawa, near Nagoya, with a capital of $498,000, is also reported. Preparations have been made for the erection of factories. It is stated that the potter's clay in the neighborhood of Kachigawa includes a rich deposit from which the company expects to manufacture aluminum. The complete stoppage of aluminum imports has sent up the price. Aluminum shows a fourfold increase, and its manufacturers have approximately doubled its price. Of the three manufacturers of aluminum articles in Japan, two have entirely stopped operations, owing to scarcity of stocks and high prices, and have already dismissed some of their workmen.

"Recent re-exports to Hongkong and the strike at the mines in Australia have had the effect of forcing up prices of lead to the unprecedented level of $10.45 per 100 pounds," says an authority, citing the fact that the annual consumption of lead in Japan is in the neighborhood of 20,000 tons, while the output in the country amounts to no more than 3,000 tons. Australian, Chinese, and Russian lead ores, the purchase of which has either been so far contracted for or is likely to be contracted for, amount to about 30,000 tons, which will yield about 15,000 tons of refined lead. Together with the Japanese output of 3,000 tons, therefore, the quantity available for domestic demand will amount to only 18,000 tons.

Owing to increased demands due to the development of the chemical industry in Japan, and also because of the cornering of the supply by some merchants, the price of platinum is more than double the normal rate. The demand for antimony has caused many Japanese mine owners to start working for that mineral, and the crude ore imported from China has also increased in quantity, but the quotation has reached seven times the price that ruled a little more than a year ago.

The Chinese government states that the antimony mines of Kuangsi will be operated under special government supervision.

The Results of Government Ownership

BY A. A. BLOW

Consulting Engineer, Southern Minerals Co., Knoxville, Tenn.

IN REPLY to your letter of April 29, asking my views as to the proposition of government ownership of industrial plants for manufacture of armor plate, nitrates or other munitions, for use either in time of peace or war, I have but one opinion to give you and this is based upon study, observation and experience in this and many other parts of the globe.

In policy or in practice, government ownership in such matters of national internal economy, would be nothing short of deliberate and premediated suicide of our commercial rights and prosperity. It is the first step towards commercial socialism, which will destroy the energy, enterprise and initiative of a people, who, under a liberal form of government, have in two centuries transformed this country from a primitive wilderness to what is now the richest, the most productive, and the most envied nation in the world.

Only when industrial progress and improvement has ceased and when internal enterprise finds no further profit in invention and competition and when politics are purified into patriotism, can government paternalism and ownership be beneficial to its people. History shows us, in innumerable instances, that such a condition has never been a success and has never survived in any age for any period of time.

This is not a theory, it is a self-evident fact, which can be demonstrated by an examination of the existing countries of the world today. A liberal government of the people, by the people, and for the people, should give all its people equal chance, it should control them, but not dominate or compete with them. If it does it is autocratic, not democratic. The absence of government ownership and industrial interference has happily made America what it is and has given us the supremacy, as an industrial nation, which we now enjoy. In almost every country on earth, the prosperity of its people seems to be in inverse proportion to the extent to which they have adopted this Utopian delusion of government ownership and control of its industrial affairs.

All Europe is suffering, more or less, from government paternalism of different degrees of intensity. England has had little of it since the days of Charles I. France also threw off the Bourbon and Napoleonic yoke and has since become prosperous and powerful. Italy has prospered on the same lines, and Russia is wise in encouraging the private development of her vast resources and loosening her autocratic hold on her property. If our politicians will only raise their eyes above the horizon of their political aspirations and consider the object lessons given them in Australia and New Zealand, the force of these remarks will be more apparent. In Australia, for example, the plan of government ownership has been thoroughly tried out. What is the result?

Australia is almost as large as the entire United States. It exists under a lenient and liberal government, framed after our own constitution. Without the expense of providing an army and navy for its own protection, it has been settled for more than 150 years, with the same race of people that settled the United States. The country is rich in many resources and occupies a position which entitles it, on account of its size, position and resources, to control the southern Pacific, and even the orient. It is absolutely independent in its form of government, so far as its industrial affairs are concerned and can make or enact any laws, it sees fit, for the best interest of the people, as is the case with every British colony since the time of our revolution. Furthermore, it is financially backed by the richest and most successful colonizing nation on earth, Great Britain, and within its own sphere of influence it has no modern nation with which to compete, in its manufacturing or commercial expansion.

But, with all these advantages, the population of the entire continent of Australia is not very much greater than was that of the United States in 1776, at the time of the revolutionary war. Its growth is so slow as to be practically negligible. The settlement of its millions of square miles is confined to a few hundred miles from the sea coast and the interior is practically unknown and entirely undeveloped. There is not a railroad across the continent from east to west, or from north to south. There is only one rolling mill, and not a modern ship building yard of any importance in the entire country. Only within the past year have steel rails been manufactured within its boundaries, although, there are abundant resources of coal and iron and other mineral resources ready and awaiting development. In the settlement of this country, there were no savage races to overcome, no Indian wars to fight, no complications with foreign countries, as we had with France, Spain and England. The climate varies from the tropical to the temperate, as it does in the American

Why Mr. Blow Wrote This Letter

The accompanying contribution was received by The Iron Trade Review in response to a letter sent to each member of the state committees on industrial resources, which were organized and appointed by the naval consulting board. Each committeeman was asked to give a frank expression of opinion on the administration's efforts to appropriate $11,000,000 *for a government armor plate plant.. As indicated in the many letters published in the three immediately preceding issues of The Iron Trade Review, the sentiment is overwhelmingly against this project. Mr. Blow's contribution is a strong arraignment of this latest attempt to foist semi-socialistic legislation on the country and at the same time amerce private industry of its right to governmental co-operation.*

continent. The people are patriotic, progressive, well educated and energetic, but these energies being deadened by government restrictions and excessive labor legislation, they often migrate from Australia, rather than remain in it. As all other races but the Anglo-Saxon, or white races, are barred entirely, by the slogan of "White Australia", the increase in population of Australia has been slow indeed. Despite favorable natural conditions, Australia has not advanced, as other countries have in the past 50 years. Why is this? I state, without hesitancy, that the principal reason is government ownership. Here, the government owns every foot of railroad, every dock or wharf in every seaport, every telephone pole, or telegraph line, and dominates with labor laws every factory or business utility of every nature.

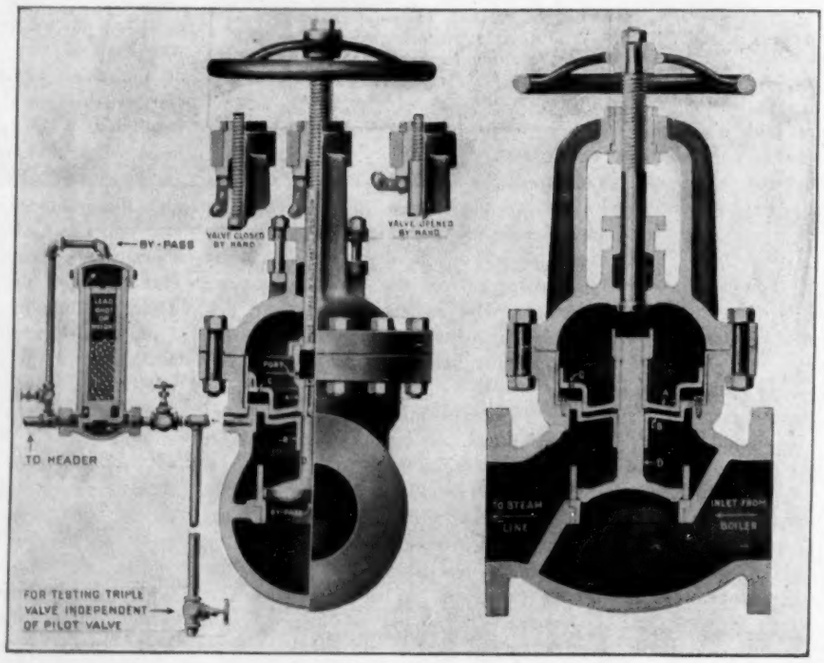
Paternalism and a mild form of socialism, or labor control, throttles every industry. Even some large ranches from which vast wealth was secured in former years by sheep raising, which made Australia famous for its wool, have been, by legislative enactment, taken over by the government and divided "for closer settlement". As a manifest result of this condition, private enterprise is discouraged, no one will undertake to build a new railroad or develop a new district and even with a government more liberal and framed, as near as possible, like our own government, for the people, it can not, with the incubus of government ownership around its neck, induce capital either from its own country, or abroad, to develop its resources.

Happily, we have not at this time tried this disastrous experiment in our country and I trust we never will. If we do, I fear the results will be the same. I have no hesitancy, therefore, in giving you my opinion that government ownership, as applied to any commercial enterprise within the United States, is a mistaken and unwise policy, which will bring disaster upon our industries in proportion to the extent to which it is carried out; and we will not realize the mistake we have made, after our government enters into such competition with its own people, until it is too late to retrace our steps.

For the above and many other potent reasons, which space prevents my giving in this letter, I am very strongly opposed to the policy of government ownership and operation, either of armor plate plants, munition plants, water power development and nitrate plants, ship yards or any other industrial development, which interferes and competes with private enterprise of its people. It has been demonstrated again and again that such work can be done cheaper, more quickly and effectively by properly controled corporations or individuals, than it can be done by the government. There is, therefore, no use in wasting the funds of the people and increasing the taxes for inadequate results. England, France, Belgium and even Germany have relied upon their Krupps, Creusots, and other great armament plants to supply their armies and navies with munitions of war, as well as other nations and we can safely assume our ability to do the same.

Develops Safety Valve for Steam Lines

IN ORDER to prevent a backward flow of steam from the header into any one of a battery of boilers, in case of accident, and also to prevent an upward rush of steam, should a break occur in the main steam line or its branches, an automatic, triple acting, non-return valve has been developed by the Golden-Anderson Valve Specialty Co., Pittsburgh. Should a header or steam main equipped with these valves be damaged, it is claimed that the outflow of steam from every boiler would be stopped immediately. As shown in the accompanying sectional view of the inner dashpot *A* is secured to the valve disc. The outer dashpot *B*, which is held firmly in place by cap bolts, as illustrated, functions as a cylinder. The valve disc is provided with a central port, carrying a pilot valve at its top. The full boiler pressure pervades the entire space above the liner and beneath the inner dashpot at *C*, thus equalizing the strains. A tube connection from the pilot valve to the space between the two dashpots communicates with exhaust ports in the side of the triple valve. The pilot valve is also connected with the outlet side of the valve or header, the header pressure above the piston of the pilot valve balancing the boiler pressure beneath it. The piston of the pilot valve is adjusted by weights which operates the triple-acting valve in case of an emergency, such as a bursted steam line beyond the valves. Should such a break occur, pressure is, of course, removed from above the pilot valve piston. The boiler pressure below unseats the piston, thus allowing the pressure between the dashpots of the triple-acting valve to escape. This in turn closes the latter. The full boiler pressure, which continues to pass through the by-pass of the valve disc on the dashpot *A*, holds the valve firmly to its seat, cutting off the flow of steam from the boilers. The double dashpot device, it is claimed, insures a satisfactory alignment of the valve disc and seat, also permitting a quick closure of the valve disc to within ⅛-inch of the seat, the valve then closing readily by means of the secondary dashpot. To close the valve permanently, the stem is run down on top of the valve disc by means of a hand wheel. The triple valve may be closed or tested independently of the pilot valve by means of a small branch line, to which a hand valve is attached, as shown herewith.



CROSS SECTION OF SAFETY STEAM VALVE

Verdun Valuable as an Iron Center

Iron Ore Deposits May Explain Persistance of Germans—British Iron and Steel Industry Feels Shortage of Men

Bureau of *The Iron Trade Review*,
Prince's Chambers, Corporation St.,
Birmingham, Eng., May 25.

APPARENTLY, the struggle for Verdun is not altogether unassociated with the great value of that district as an important iron-making center. Senator Henri Beranger has called attention in *Le Matin* to the great importance of that district from the iron and steel point of view. It is significant that the Germans as a first step seized the Briey basin which represented something like 90 per cent of the total iron production. According to a confidential memorandum addressed by German associations to Bethmann-Hollwegg, "If the production of iron ore and steel had not doubled since August, 1914, the continuation of the war would have been impossible". The French writer says:

"The output from Briey covers at the moment from 60 to 80 per cent of the iron and steel manufactures. If this production were interrupted, the war would be as good as lost. The Germans may think that if they are masters of Verdun they are masters of the whole situation, but if we keep Verdun and take Metz we shall bring the war to an end, since we should retake 42,000,000 tons of iron out of 49,000,000".

If this version is correct, there seems to be some reason for the writer's conclusion that "iron is king in this war", and it may be that the iron and steel question may be connected with a comparatively early conclusion of the war.

Pig Iron Scarce in England

Pig iron scarcity continues a pressing element of the situation in the iron and steel trades. The stocks at Middlesborough steadily decrease. At present, the total in store is 33,000 tons. The demand for hematite has been increasing without any corresponding advance in production. The trade could take a great deal more from the furnaces, and other furnaces could be put into blast if the necessary workmen could be obtained.

At the Birmingham meeting recently, all quotations were at the maximum prices, and South Staffordshire smelters, dealing in irons of the highest class, state that they find it difficult to execute the orders for the allies. The scarcity of coke is a serious difficulty, and there is practically no surplus over the amounts to which the producers are committed, under existing contracts. Recent restrictions on exports have very nearly shut down shipments from Cleveland to neutral markets. There is a very good call for foundry material, mainly for machinery and other products connected with the war. Most of the furnaces have orders for three or four months on their books. There is no desire to accept forward business, and all offers of orders are being refused, to buyers who are not prepared to undertake to pay the proportionately higher prices that may be demanded under the July government maxima. A special committee has been appointed for the Middlesborough district to locate and distribute pig iron according to the requirements and national character of the orders.

In the Barrow district, the government is pressing strongly for supplies, and some further furnaces have been put in blast, but great pressure is being brought to bear upon the government to assist in furnishing the requisite men. It seems almost incredible that an opposite policy should have been followed lately, but it is reported that limestone quarries and ore mines have been obliged to contribute a share of the additional men called for under new recruiting demands. Naturally, the committees dealing with supplies are doing their best to impress the authorities that they cannot have these men for the army, and at the same time take advantage of the material which in civil life they have been accustomed to produce. If the recent demand of the government for a further 10,000 miners for trenching and tunneling in the war area is acceeded to, the result must be a further substantial reduction of output, first of coal and afterwards of iron and steel.

Unsound Steel

A British steelmaker well known in America, Sir Robert Hadfield, paid a compliment to America when presiding recently at the annual meeting of Hadfields, Ltd., Sheffield. Sir Robert called attention to the lack of technical knowledge in the British government. He said the war was certainly a most technical one, and demanded all the best efforts of science and technical knowledge, whether as regarded military, mechanical, electrical, chemical, civil, mining, hydraulic or metallurgical engineering and different other branches. All these were called into operation every day of the war, yet the cabinet did not contain a single representative of any of these branches.

There ought to be a minister of commerce, a minister of science and a minister of air. The enemy was well represented in this respect, and he could vouch for the fact that the head of Krupps had for many years personally reported every fortnight by actual attendance to the head of the empire as to the progress of the work at Essen. That he got from Herr Krupp von Bohlen himself. Sir Robert related an experience he had in America two years ago, proving the value of the secretary of commerce. He was asked his views on the question of unsound steel rails and as a result of the interview immediate orders were given for tests to be made. Great attention was being paid to this subject in America, and improvements all along the line were being effected. Imagine a matter of that kind being taken up in England. The board of trade, which did so many things and yet did nothing thoroughly, would not interfere to show any really active interest as did the secretary of commerce in America in the matter he had mentioned. There are many matters of a kindred nature with which a minister of commerce could better grapple than the somewhat antiquated and out-of-date department known as the board of trade.

Hand Book for Russia

The American-Russian Chamber of Commerce, 60 Broadway, New York City, has decided to prepare for exclusive distribution in Russia a hand book on American financial and commercial conditions, containing a directory of selected American business houses. In making up the classified directory, the chamber will attempt to register American firms which are actually interested in the Russian market and are in a position to meet the requirements of the Russian customers.

Iron and Money: Fact and Comment

Officials of Iron and Steel Companies Are Under Continuous Strain in These Days of Rushing Business Activity

FULL order books and plants operating at capacity do not mean that the lives of steel company executives, sales managers, credit men and other officials resemble sweet slumber in a bed of roses. The nervous tension caused by unusual activity, labor troubles, customers who must be appeased, freight embargoes and delayed deliveries are taxing the capacity of officials to almost the same degree that their plants are being pushed. In addition, officials are worried by the tremendous uncertainties underlying the present situation. War business is profitable, especially to those companies selling shell steel. But it is uncertain. Then there are the domestic customers who are tempted to overbuy and who must be kept to their actual requirements, not to speak of those individuals whose dreams of sudden wealth have led them to try to capitalize their wits. However, these would-be speculators have found the sellers of iron and steel commodities about as pliable as high-speed steel. The perplexities of the iron and steel situation are numerous and complicated. Nevertheless, each day that passes means added strength to the financial position of operating companies. Remarking about steel trade conditions, a leading official in a prominent steel company says:

"Under such abnormal conditions as have existed since shortly after the outbreak of the European war, the tendency to overbuy has been pronounced, but we have been more vigorous than ever before in our efforts to limit our trade to its normal requirements.

"There is another point to be considered, too. Promoters and capitalists must be taught to realize that a reversal in trade conditions may occur before they can build and equip plants to supply anxious customers. Building material and equipment is so expensive today that it would be folly for any one to venture into any line of business without first having enough orders on his books to insure success. Any number of people have approached us for building material, saying that they could erect, equip and pay for a plant in 12 months' time. If these people could obtain necessary raw material, they undoubtedly would be able to realize enormous profits in some fields. Of course, some speculative tonnage has found its way to the order books of all manufacturers, but I do not believe there is anything dangerous about the present situation."

The credit manager of a large company filling "war orders" declares the companies engaged in the manufacture of war material on a large scale may be seriously embarrassed either before or after peace is declared, unless they are able to fortify themselves with orders for domestic tonnages. He said:

"While we have been furnishing heavy tonnages of steel entering into the manufacture of munitions for the allies, we have an extremely large volume of domestic business on our books and would not be forced to close our plants, even though the European war should unexpectedly terminate. However, some concerns are not so fortunate as we are; they may be hard hit. It would be an easy matter for any one of the entente nations to cancel the majority of war order contracts, simply because American manufacturers have fallen behind in shipments. Failure to meet specification for delivery is a distinct violation of the war order contracts with which I am familiar. As yet, purchasers have not attempted to cancel contracts simply because war material is wanted and needed badly.

"Strikes have delayed many plants engaged in filling war order contracts, causing heavy financial losses. Numerous concerns have had large sums of money tied up for an indefinte period, because of the difficulty in obtaining bottoms. Such concerns might be seriously embarrassed. Their contracts might be cancelled. However, we believe that the vast majority of munition manufacturers have amply protected themselves against any possible reversal of the situation, and I think that the possibility of failure is not nearly so great as it was a few months ago."

Merge Auto Makers

New York, June 6.—A giant new holding company to take control of leading automobile and motor accessory manufacturing companies, is in the process of formation and the capitalization, the preliminary announcement says may be $200,000,000. Among the companies which are to join forces are the Willys-Overland Co., of Toledo; the Hudson Motor Co., the Chalmers Motor Co. of Detroit, and the Electric Auto-Lite Co., of Toledo. The holding company which will take over the stocks of these companies also will acquire a substantial interest in the newly-formed United Motors Co., which recently was formed to combine five large accessory companies. Later, a tire company and a leading truck builder may be included in the combination. L. G. Kaufman, president of the Chatham & Phenix National bank, New York, will be chairman of the finance committee of the new company, the name of which has not yet been determined. It is understood at the beginning, at least, there will be no interference with the management of any of the constituent companies and they will be operated as subsidiaries of the parent corporation.

The Financial Situation

The big naval engagement between the British and German fleets off the coast of Denmark caused hardly a ripple of excitement in American financial markets. Neither has the approach of the Republican convention at Chicago found much reflection in the stock market, although marked by more widespread interest than is usually displayed prior to the nomination of party candidates. Wall Street has given little heed to the Mexican note, which is believed to be principally for home consumption. In general, the business situation has shown little change in the past week or month.

The stock market seems to be marking time, yet a glance backward at the transactions in May discloses that Wall Street share trading was the heaviest last month of any May since 1908 and bond trading was the most expansive since 1911. Commercial failures were more numerous by 83 in May than in April, but liabilities were lighter. New financing showed a considerable decrease in May from the average of the preceeding six months, but it was of fair volume. Bank clearings in the manufacturing districts of the east are 40 to 60 per cent higher than a year ago and in cities more directly connected with the agricultural interests, 20 to 40 per cent. Railroad traffic could hardly

be heavier with present facilities. The fundamental conditions, which include full employment of the people and the production of commodities, were never better. The country as a whole seems to be doing business with a full appreciation that conditions are extraordinary and subject to change, and yet with a large degree of confidence in the future.

The most interesting movement of late in the iron and steel division of the stock market have included the downward trend in Great Northern Ore certificates, which have declined over three points since the death of James J. Hill. Gulf States Steel furnished most of the fireworks during the past week, due probably to rumors of an initial dividend on the second preferred stock in the near future. Gulf States Steel common jumped 11 points during the week to 87, first preferred 3⅞ points to 101, and second preferred 1 point to 88. Below is a table showing quotations of iron and steel stocks on the New York exchange at the close of business June 3, and net changes for the week.

	Close June 3.	Net chg.
American Can	55½	— ¾
American Can, prfd.	111	— ½
Amer. Car & Fdy.	59	—1
Amer. Car & Fdy., prfd.	117⅛	+ ⅛
American Locomotive	71½	— ½
American Locomotive, prfd.	101¼	— ¾
Amer. Steel Foundries	50½	—2
Baldwin Locomotive	88⅞	+ ⅞
Baldwin Locomotive, prfd.	109¾	— ¼
Bethlehem Steel	445	—14½
Colorado Fuel & Iron	42½	— ¼
Continental Can	100	—1
Continental Can, prfd.	112	+1
Crucible Steel	83	—1½
Crucible Steel, prfd.	116	—1¼
General Electric	169½	— ⅞
Internat'l Harv. of N. J.	112	.....
Inter. Harv. of N. J., prfd.	117	.....
Internat'l Harv. Corp.	82	+1½
Internat'l Harv. Corp., prfd.	106½	+1⅝
Lackawanna Steel	69	—1¼
Nat'l Enamel'g & Stmp. Co.	23⅝	+ ½
Pressed Steel Car	46	—1
Pullman Palace Car	164	—1
Republic Iron & Steel	47¼	+ ⅛
Republic Iron & Steel, prfd.	111⅞	+ ⅛
U. S. C. Iron Pipe & Fdy.	23¼	+1¼
U. S. C. I. P. & Fdy., prfd.	51	+1
United States Steel	83¾	.....
United States Steel, prfd.	117⅜	+ ⅜
Westinghouse Mfg.	61¼	— ⅜

The following table shows changes in maximum quotations of stocks not listed on the New York stock exchange:

	June 2.	May 26.
American Radiator	398	397
American Ship Building	...	45
Cambria Steel	82⅜	90
Chicago Pneumatic Tool	73¼	73
LaBelle Iron Works	52¼	52¾
Lake Superior Corp'n	10⅜	10⅜
Stewart-Warner Speed. Co.	92	90
Warwick Iron & Steel	11⅛	11
Westinghouse Air Brake	137	137
Westinghouse Elec. & Mfg.	62⅛	63⅛

The Colonial Iron Co., Riddlesburg, Pa., has under construction 18 additional beehive ovens to its plant, which is operated in connection with the company's blast furnace. This will increase the extent of the coke plant to 214 ovens.

Financial Crop Ends

THE Manufacturers' Iron & Steel Corporation has been incorporated at Albany, N. Y., with a capital of $8,000,000 for the purpose of acquiring the Never-Slip Mfg. Co., New Brunswick, N. J., and the Dryden Horseshoe Co., Catasauqua, Pa. The new corporation will be a holding company for these two manufacturers of horseshoes and, it is stated, there will be no change in the plan of operations of the two companies. The directors of the new corporation are: James W. Johnson, William J. McCurdy, Robert C. Nicholas, of New Brunswick; N. Morley Holten, of Catasauqua, and Herman Gustow, of New York. Mr. McCurdy has been president of the Never-Slip company.

* * *

Edmond H. Patterson has been elected president of the recently formed Virginia Steel Corporation. Contracts have been let for the construction of a plant at Hopewell, Va., to cost approximately $1,500,000.

* * *

Joseph E. Doucette, treasurer of the National Tack Co., Inc., East Bridgewater, Mass., has filed a petition in bankruptcy in the United States district court, Boston, on behalf of the company. The liabilities are $7,902 and the assets $7,450.

* * *

The Semet-Solvay Co. has given bankers interested in its plan to expand a balance sheet showing total assets of $12,228,000. Cash amounts to $1,769,000, inventories $2,000,000 and bills receivable $2,364,000. An item of $3,221,000 is given under the head of investments.

* * *

Steel ship building is being inaugurated in Nova Scotia. Erection of a shipyard has already begun near New Glasgow. The site for this industry is below the plant of the Eastern Car Co.'s works, on the East river of Pictou. The first steamer to be built will be for the Nova Scotia Steel & Coal Co., which is backing the new ship yard.

* * *

The Fulton Metal Bed Co., Atlanta, Ga., has been doing business at the rate of $100,000 a year so far in 1916, an increase of 300 per cent over the corresponding period in 1915. The company makes 75 designs of metal beds. Officers of the company are: President, W. W. Heaton, Waco, Ga.; vice president, J. T. Duncan, Douglasville, Ga.; secretary and treasurer, L. C. McKiney.

* * *

W. C. Durant was elected president of the General Motors Co. Thursday, succeeding Charles W. Nash, thus ending the long fued for control of the company between Mr. Durant and his friends and banking interests who took part in the rehabilitation of the company several years ago when it had suffered financial setbacks. Dr. Durant also is president of the Chevrolet Motor Co.

* * *

Clarence H. Venner, of New York, holder of common stock of the Pennsylvania Steel Co., who recently lost an action in the United States district court at Trenton, N. J., to restrain the sale of the Pennsylvania Steel Co. to the Bethlehem Steel Corporation, has filed an appeal to the United States circuit court of appeals. The court recently dismissed a temporary injunction against the sale.

* * *

The American Manganese Steel Co., Chicago, has purchased the plant of the Brylgon Steel Casting Co., New Castle, Del. This plant, which is arranged for the production of steel castings, has a monthly capacity of 400 tons. The American Manganese Steel Co. is installing additional equipment for the production of manganese steel castings and it is expected that the plant will be operating under the new management by July 15.

* * *

The Pittsburgh Steel Co. will call for payment on July 1 the $1,000,000 of its 6 per cent notes due Jan. 1, 1920. The company will then have outstanding only $1,000,000 notes due Jan, 1, 1920, having paid out of surplus earnings for four new open hearth furnaces being erected to round out its plant. Both gross and net earnings are the largest in the company's history. The original issue of notes amounted to $5,000,000, due 1918-1920.

* * *

The Exeter Machine Works, West Pittston, Pa., has been placed in the hands of receivers at the petition of three creditors who allege the company is insolvent and unable to pay its debts. The company has been working for months on war orders, said to have been sublet by the Bethlehem Steel Corporation. Its book assets are said to be between $800,000 and $900,000 and its liabilities between $600,000 and $700,000. The Exeter company has been operating since 1888 and at present is rushed with business. J. N. Thomas is president.

* * *

A syndicate of Wisconsin capital, headed by the Wisconsin Security Co., Milwaukee, has purchased a major interest in the Baltimore Dry Dock & Ship Building Co. The deal is said to involve $1,000,000. The company operates two large docks, one for new work and the other for repairs. Contracts on hand are valued at $3,250,000 and the working force numbers 1,982 men. Thomas H. Bowles, president, retains his interest but retires as active head, being succeeded by H. A. Evans, graduate of the naval academy at Annapolis and in charge of several government yards before joining the Baltimore company.

* * *

The Allis-Chalmers Mfg. Co., Milwaukee, has declared an extra dividend of 1½ per cent on account of back dividends on preferred stock, in addition to the regular quarterly dividend of 1½ per cent. The back dividends outstanding after this disbursement will amount to 11½ per cent. The company's earnings for 1915 were only about 6 per cent on the preferred stock, although last quarter of 1915 profits were at the rate of 14 per cent. Earnings the first quarter of 1916 were said to have been at the rate of 18 per cent and it is believed in financial circles that this year the company will earn enough to take care of all its back dividends, should it choose to do so.

News of Employers and Employes

Wisconsin Tries an Interesting Experiment in Settling Labor Disputes—Further Strikes in New England

THE industrial commission of Wisconsin has undertaken the investigation of the hours of labor situation in the Milwaukee metal-working trades, as requested in a petition by 36 of the largest employers in this industry. Testimony is being heard in Milwaukee by the three commissioners, J. D. Beck, F. M. Wilcox and George P. Hambrecht. The employers and the machinists' union are represented by three. Edwin E. Witte, assistant professor of political economy, University of Wisconsin, is acting as secretary to collect and analyze the information in collaboration with the commissioners. The union has deferred making a formal demand for an eight-hour day, with the present pay, until the investigation is completed.

The purpose of the investigation is to get facts, and it is not the purpose to decide any question or dispute, according to a member of the industrial commission. The investigation will not bind anyone to do anything. All interests represented want all the information that can be collected within a reasonable time, and will be left to exercise their own judgment as to what use can be made of the material so gathered.

The employers simply requested the commission to make an impartial investigation of the hours of labor conditions in Milwaukee, compared with those in competing lines in other middle western centers so that they may be better enabled to answer any demand from employes with respect to changing the hours of labor and pay.

Prof. John R. Commons, noted economist, and member of the Wisconsin university faculty, who recently conducted a similar investigation in the Pittsburgh district, is acting in this capacity for the Wisconsin commission at this time.

New England Restless

A partial settlement of the strike at the Saco-Lowell shops, Newton Upper Falls, Mass., has been made and 500 of the 700 employes have returned to work. Those remaining out are the snaggers in the foundry, most of whom are foreigners. They are regarded as important in their line of work and are of a class that is hard to replace under present conditions. The company compromised with the men by increasing their wages on a 10-hour day basis.

The molders of the Montague Machine Co.'s foundry department, Turners Falls, Mass., who were out on strike 10 days, have settled their differences and returned to work.

There is a strike of 500 employes of the American Wringer Co., Woonsocket, R. I., for increased pay and shorter hours. They claim that recent readjustments of pay were not satisfactory, and that they are working 56 hours a week, while other plants work 54. The company has informed the men that it could not grant their demands for a 15 per cent increase and a 54-hour week.

The strike at the Rhode Island Malleable Iron works, Hillsgrove, R. I., has been settled and the men have returned to work. A minimum wage, increases in pay, shorter hours and a new scale for overtime, making an equalization of the work, form the terms which brought about the settlement.

James E. Greensmith, for the past year assistant general manager of the New England Westinghouse Co., Chicopee Falls, Mass., has resigned to become president of the Boston Scale & Machine Co., a new $300,000 Massachusetts corporation which will locate in Boston.

New Wage Plan

Bullard Machine Tool Co., Bridgeport, Conn., has inaugurated the "Maxipay wage plan" at its plant, affecting more than 600 employes. In making announcement of it the company says:

"Skill and proficiency are the actual foundations of low costs of production —not a low hourly wage." The "Maxipay plan," the company says, has been developed from basic facts, one of which is, "that the longer a man is with us, the better is his work, because of his development in skill and his greater knowledge of the special needs in the building of our machines."

The plan itself is the classification of the company's employes into four classes. Under this classification, the lowest wage paid to an employe will be 25 cents an hour and each employe is placed in a position to realize wages to the full extent of his ability. There is a minimum but no maximum. With this plan a worker will receive value for what he produces, regardless of the amount.

"As a further incentive to continued and regular attendance, we will maintain our continued service bonus payments of 10 per cent of full weekly wage," says the announcement. "This is in no sense a part of the hourly rate, nor is it considered by us a wage payment. It is a distinct reward for regular and continued service and is made possible only by the fulfillment of production schedules which could not otherwise be maintained."

Stock for Employes

Chicago, June 6. — Announcement is made by the Pullman Co. that 5,000 shares of stock have been set aside for purchase by employes at $155 a share. The market price at present is close to $163 a share. Employes will be allowed to subscribe to stock in proportion to their earnings, those receiving $500 per year being limited to one share, while men receiving $12,000 per year may buy 25 shares or less.

Payments will be made at the rate of $4 per share per month and dividends will be credited on purchase price, the final payment being made 34 months after purchase.

The following letter by President J. S. Runnells explains his position on this new plan:

"Every application for stock must be sent to the treasurer, whether approved by the head of the department or not; but, if not approved, the reasons therefor should be reported with the application. Without defining or specifying the reasons which may justify the withholding of approval, I may suggest as some of these reasons the general failure of the subscriber to pay his debts, or to properly support his family, if he has one; or bad habits, which render him insensible generally to his duties and neglectful of his own self-respect. I urge upon you the careful consideration of every application, remembering that it will be no kindness to the employe to aid him in assuming an obligation he is not likely to be able or willing to carry out.

"As I have said, the purpose of this action is helpfulness to the employe. I ask your earnest and sympathetic aid in making it effective."

Several hundred puddlers of the Reading Iron Co., Reading, Pa., after a conference, have decided to accept the company's offer of $6 a ton and this rate now is in effect.

Business News of Nation's Capital

Naval Bill Contains Many Anti-Business Provisions—Steel Industry and Ship Builders Are Attacked

Bureau of *The Iron Trade Review*,
206 Corcoran Bldg.,
Washington, D. C., June 6.

DISTRUST and even hostility toward private business is in evidence throughout the adminstration naval bill, carrying appropriations amounting to $269,900,000, which passed the house last Friday afternoon by a vote of 358 to 4. It necessarily follows that a measure so constructed carries provisions that are in direct conflict with the ideas of preparedness and industrial mobilization which its supporters have so insistently shouted for, but voted against.

The most directly antagonistic blow at private industry and preparedness was represented by the amendment offered by Chairman Padgett, of the committee on naval affairs appropriating $11,000,000 for a government-owned armor plate plant, with an annual capacity of 20,000 tons. During the three-hour discussion on this amendment, the bitterness displayed by its supporters toward armor manufacturers in particular and the steel trade generally was amazing. Many contentions made in support of the amendment were obviously biased, and based on an almost utter lack of understanding of the subject. These so-called arguments descended to the ludicrous and would have been amusing, were not the subject involved of such momentous importance. On the other hand, support given to the amendment offered by Representative Butler, of Pennsylvania, ranking Republican member of the committee, providing that the federal trade commission inventory the private armor plants and fix the price at which the government would purchase armor plate, was given in a remarkably able manner. Especially were the addresses of members from Pennsylvania favoring the Butler amendment concise, clear and thoroughly convincing to any mind that was open to conviction. A bill similar to the administration armor plate amendment recently passed the senate. The Butler amendment was handled in a thorough manner, and some of the Pennsylvania representatives took the subject up from a rather technical point of view, yet making it perfectly understandable. But supporters of the administration amendment refused to listen to the logical views presented and despite the fact that the feeble arguments administration supporters made in favor of the government plant were utterly destroyed by the opposition, they went on record in favor of the amendment, which was supplemented by a provision offered by Mr. Padgett that the government shall acquire a site for the plant by purchase, condemnation or gift. Despite the passage of the amendment, however, there continues a strong conviction that Secretary of Navy Daniels, who has been the most vociferous for the plant, will never authorize actual construction of the plant. So far, however, he has given no heed to the fact that industrial mobilization engineers are opposed to the erection of a government plant.

In the committee of the whole the amendment carried by a vote of 165 to 91, while in the house proper, when a record vote was taken, it carried by a vote of 235 to 136. There were 46 Republicans, three Progressives and one Independent, almost exclusively from the middle and far west, who supported the administration amendment, while seven Democrats, from Pennsylvania and New York, voted against it.

Republicans Who Switched

Republicans who voted in favor of the government-owned armor plate plant amendment are as follows: Britt, North Carolina; Cary, Wisconsin; Cooper, Wisconsin; Cramton, Michigan; Curry, California; Dillon, South Dakota; Dowell, Iowa; Ellsworth, Minnesota; Emerson, Ohio; Esch, Wisconsin; Frear, Wisconsin; Good, Iowa; Green, Iowa; Hadley, Washington; Haskell, New York; Haugen, Iowa; Helgesen, North Dakota; Hull, Iowa; Humphrey, Washington; James, Michigan; Johnson, South Dakota; Johnson, Washington; Kinkaid, Nevada; LaFollette, Washington; Lenroot, Wisconsin; McCracken, Idaho; Mapes, Washington; Morgan, Oklahoma; Nelson Wisconsin; Nichols, Michigan; Nolan, California; Norton, North Dakota; Ramseyer, Ohio; Reavis, Nebraska; Ricketts, Ohio; Russell, Ohio; Sinnott, Oregon; Sloan, Nebraska; Sweet, Ohio; Volstead, Minnesota; Wheeler, Illinois; T. S. Williams, Illinois; Williams, Ohio; Woods, Iowa; Young, North Dakota.

Progressives who voted for the amendment include: Elston, California; Martin, Louisiana; Schall, Minnesota. The Independent who voted for the amendment was Kent, California. Browne, Republican, Wisconsin, voted present.

Democrats who voted against the amendment are: Dewalt, Lesher, Liebel and Steele, Pennsylvania, and Driscoll, Loft and Patten, New York.

Efficiency Knocked Out

Another rider was enacted which strikes a blow at efficiency and therefore at industrial mobilization. It was inserted at the behest of organized labor and provides for a continuance of the measure now in force, preventing scientific shop management in navy yards. Representative Browne, Republican, of Wisconsin, who wrote the house labor committee minority report on the Tavenner bill, made a motion to strike the rider out. The motion was lost by a vote in the committee of the whole of 100 to 74. Among those most strongly supporting the amendment were Mr. Browne and Representative Sherley, Democrat, of Kentucky, chairman of the subcommittee which framed the fortifications appropriation bill. Mr. Sherley's position denotes that he will bitterly fight the attempt of organized labor to incorporate a similar rider in the fortifications bill to eliminate scientific shop management at Watertown arsenal. Representative Keating, Democrat, of Colorado, who wrote the report favoring passage of the Tavenner bill, led the fight in favor of the rider.

Fear that private ship building yards and steel manufacturers would take unfair advantage of an amendment offered by Mr. Padgett and adopted by the house, authorizing the secretary of the navy to pay bonuses not exceeding 20 per cent of the limit of cost of ships for expeditious construction and for expeditious delivery of material was noted in another amendment, which was also offered by Mr. Padgett and adopted by the house. This latter amendment provides that in the event the secretary of the navy is unable to secure from the ship builders, contracts for expedi-

tious construction, at a fair and reasonable price, $6,000,000 is appropriated to equip the navy yards at Puget Sound, Philadelphia, Norfolk, Boston, Portsmouth, Charleston and New Orleans for the construction of the vessels authorized. The bonus which is provided for applies to both private and governmental ship building. Mr. Padgett said he was afraid ship builders might take advantage of the bonus offer and form a combination, making bids for a long period of construction. Then, he feared, they would ask a bonus to come down to the ordinary period of construction, the government being helpless in the matter unless the navy yards are enlarged so that they could do the work. Representative Stafford, Republican, of Wisconsin, assailed the amendment, and said it not only would endanger private ship building industries, but that it represented "pork and pie". It was said the term "a fair and reasonable price" could be interpreted at the will of the secretary, and government yards estimates, when too low, had to be supplemented by further appropriation from the treasury.

Another anti-preparedness provision in the measure calls for a government-owned projectile plant, to cost $1,411,222, for which an initial appropriation of $705,611 is allotted. The house once more opposed preparedness by refusing to accept an amendment offered by Representative Tilson, Republican, of Connecticut, providing for purchase of dies, gages, jigs, and other special appliances for the standardization of war materials. It was proposed that these appliances would be supplied by the government to private plants for the quick manufacture of such materials. The army reorganization bill, which has passed congress, carries the provision and it is also incorporated in the fortifications bill, which probably will be taken up soon after the national conventions.

Dreadnaughts Deemed Unnecessary

The naval bill makes no provision for dreadnaughts, but it is considered probable that the senate will make appropriations for this type of capital ships. A motion by Minority Leader Mann to recommit the measure and instruct the naval committee to include the larger building program urged by the minority members of the committee was defeated by the close vote of 189 to 183. The bill, as it passed the house, is virtually in the same form as it came from the naval committee, the principal amendment adopted increasing the number of coast defense submarines from 20 to 50, as had been recommended by the minority members of the committee. The bill provides for the construction of five battle cruisers, four scout cruisers, 10 destroyers, 53 submarines and 130 aeroplanes next year.

Ore Output Heavy in 1915

Geological Survey Figures Covering Entire Country Show Increase of 14,000,000 Tons

THE iron ore mining in the United States in 1915 reached the great total of 55,526,490 gross tons, the greatest output made in any year except 1910 and 1913. The shipments in 1915, namely 55,493,100 gross tons, valued at $101,288,984, were a little less than the quantity mined, according to figures recently compiled by E. F. Burchard, of the U. S. geological survey. The quantity mined in 1915 was an increase of 14,000,000 tons over the output in 1914. The increase in quantity and in value of iron ore shipped amounted to about 40 and 41 per cent, respectively. The average value per ton in 1915 was $1.83, compared with $1.81 in 1914.

Iron Mining by States

Iron ore was mined in 27 states in 1914 and 23 in 1915. Three of these states, Idaho, Nevada and Utah, produced small quantities of ore for metallurgical flux only; part of the production from California and Colorado was for smelter flux and part for pig iron and ferro-alloys; the remaining states produced iron ore for blast furnace use only except small tonnages for paint from Georgia, Michigan, New York, Pennsylvania and Wisconsin. Five states, Minnesota, Michigan, Alabama, Wisconsin and New York, which have in recent years produced the largest quantities of iron ore, occupied their accustomed places in 1915. Only one of these states, New York, produced less than 1,000,000 tons in 1915.

Iron Mining by Districts

The principal iron-mining districts in the United States, except the Adirondack district, are interstate, and statistics of production by districts are of more interest and importance than statistics by states. The Lake Superior district mined nearly 85 per cent of the total ore in 1915 and the Birmingham district about 8.5 per cent, or a little more than one-tenth as much as the Lake district. None of the other districts mined as much as 1,000,000 tons. The increase in production in 1915 was especially marked in the Lake Superior district, where it reached 40 per cent; the Adirondack and Chattanooga districts each showed a large increase, namely, 28 and 25 per cent, respectively; the total for a number of widely separated districts, including those in the western states, showed a decrease as compared with 1914.

Iron ore mined in the United States in 1914 and 1915, in long tons, is as follows:

State.	1914.	1915.
Minnesota	21,946,901	33,464,660
Michigan	10,796,200	12,514,516
Alabama	4,838,959	5,309,354
Wisconsin	886,512	1,095,388
New York	785,377	998,845
Wyoming	366,962	434,513
New Jersey	350,135	415,234
Pennsylvania	406,326	363,309
Virginia	378,520	348,042
Tennessee	330,214	284,185
Georgia	67,722	115,701
North Carolina	57,667	66,453
Missouri	37,554	40,290
New Mexico	81,980	34,806
Colorado	10,464	(a)
Connecticut	9,149	(a)
Maryland	6,369	5,500
Nevada	(a)	3,993
Massachusetts	7,600	3,950
Ohio	5,138	3,455
California	1,282	646
Kentucky	21,400	.....
West Virginia	6,530	.....
Other states (b)	40,800	23,650
Total	41,439,761	55,526,490

(a) Less than three producers in Colorado and Connecticut in 1915 and in Nevada in 1914, and permission was not granted to publish state totals. Increases and decreases in 1915; therefore, included in "other states."
(b) 1914: Idaho, Mississippi, Montana, Nevada, and Utah; 1915: Colorado, Connecticut, Idaho, and Utah.

The Van Dorn & Dutton Co., gear manufacturer, Cleveland, anuounces the removal of its Denver offices from the Ideal building to 1633 Tremont street. C. H. Davidson is the sales manager in charge in that district.

The Locomotive Stoker Co. announces the removal on May 15 of its general offices and main manufacturing business to Pittsburgh. The Schenectady plant, occupied for a number of years, has been completely outgrown. The main works and general offices will be located at Robinson and Darrah streets, Northside,

At a recent meeting of the Pittsburgh convention committee, which had charge of the triple joint convention of machinery dealers and manufacturers and the American Iron, Steel and Heavy Hardware Association, it was decided to make this committee a permanent organization. Col. H. P. Bope, vice president of the Carnegie Steel Co., is chairman of the committee.

The Philadelphia offices of the Youngstown Sheet & Tube Co. have been removed from the Widener building to rooms 1615 and 1616 Pennsylvania building.

No Need for Acid Test

Business Men Glad to Give Employes Chance to Serve Country—Response Unanimous

The announcement by President Wilson in his Memorial Day address that the "acid test" is about to be applied to business men to determine whether they will allow their employes to volunteer for the service of their country has resulted in employers representing many hundreds of thousands of employes declaring that they will stand back of the President in helping to organize a volunteer army. Judge Gary, speaking for the Steel Corporation and its subsidiaries, was one of the first to respond to the telegraphic inquiry of *The Iron Trade Review*. M. A. Hanna & Co., Cleveland, representing very extensive iron ore, coke and other companies, stated that they expected to co-operate in every way and to so arrange their business that any young man in their employ could volunteer in the citizen army. President Clarke, of the Lackawanna Steel Co., said that his company has always been glad to have its employes serve in military organizations and has already authorized the necessary leave under full pay for those desiring to join military instruction camps. A similar declaration was made by B. F. Bourne, of the Bourne-Fuller Co., Cleveland.

Business Men Resent Implication

Naturally there is some feeling of resentment because the President felt it necessary to say anything about the "acid test". John A. Topping, chairman of the Republic Iron & Steel Co., in a telegram to *The Iron Trade Review*, says that to impugn the loyalty of business by suggestions of "acid test" is to discredit business history. He predicts that corporate interests will for business reasons co-operate in this movement, as they have indicated their willingness in all other matters for the general good. He expresses the opinion that preparedness, to be effective, should be obligatory alike upon employer and employe. Others believe in an absolutely voluntary service. Some business men who differ radically with the President in regard to many of his policies, particularly those relating to the shipping bill, armor plate plant and other questionable schemes, do not like the idea of being challenged in the vigorous manner adopted in the Memorial Day address, but there is practically unanimous sentiment in favor of putting aside differences of opinion on other subjects and uniting to organize a volunteer army that will be a credit to the country. It is realized that only a beginning can be made under the present administration, and that all who are in favor of a change at the White House will have an opportunity to express their opinions at the polls in November.

I. W. Frank, president, United Engineering & Foundry Co., Pittsburgh, writes as follows: "The employers' association of Pittsburgh recently passed a resolution suggesting to the manufacturers that they pay any of their employes that may be on militia or summer camp duty, during the period of their absence on such duty. The association, also, has advised posting notices to this effect, thus encouraging young men to join the militia or summer camp organizations."

B. F. Bourne, president of the Bourne-Fuller Co., Cleveland, heartily endorses the stand taken by many concerns in urging their employes to take advantage of the military camps and to belong to military organizations. "The Bourne-Fuller Co.", stated Mr. Bourne to a representative of *The Iron Trade Review*, "was among the very first to urge its men to join military organizations, and we made it a point to see that each man was informed that he would lose nothing by so doing. I am heartily in favor of these camps; they are good for the country and for the men. We are for preparedness and are willing to do everything in our power to make the preparedness program a success."

Manufacturers Unanimous

H. A. Marting, president and general manager of the Marting Iron & Steel Co., Ironton, O., states emphatically that, "We expect to co-operate in every way possible, and to arrange our business in such a way that any young man in our employ may volunteer in the army if he chooses to do so".

Numerous other manufacturers including the Whitaker-Glessner Co., Wheeling, W. Va., and the Sharon Steel Hoop Co., Sharon, Pa., have signified their willingness to co-operate in this important matter.

Hill Had the Vision and Courage of a Master

By Rukard Hurd

The acquisition of land containing many millions of tons of iron ore at a time when its extent and value were unknown was any man's opportunity, but it took the mind, the courage and the vision of a master to comprehend that the ore and the value were there and that opportunity was knocking at his door. It meant to him traffic insurance, vast freight receipts for many years from a crop that knows no failure; it meant to him added industry and the profitable employment of capital and labor.

I shall never forget a conference with him an evening two years ago in his home, lasting from eight o'clock till one in the morning. He had never heard of a scientific method of ore valuation or realized that it could be done, but his active mind instantly grasped the various intricate stages of the process. He was indeed a wonder. I consider myself very fortunate in having known James J. Hill.

New Mines Opened

Big Demand for Ore Results in Great Activity on Mesabi Range

The present great demand for iron ore has led to the development of several new properties on the Mesabi range. The Oliver Iron Mining Co., subsidiary of the United States Steel Corporation, is opening the Kerr mine, formerly known as the Sheriden, located west of Hibbing near to the great Hull-Rust and Mahoning pits. The overburden, which is quite shallow, is being dumped into Carson lake. The Kerr is expected to ship about 500,000 tons this season.

The Longyear-Bennett interests have developed the Mace No. 2 mine at Nashwauk. This open pit was stripped by Butler Brothers. In executing this work they used a large Bucyrus revolving shovel, described in *The Iron Trade Review*, Jan. 6, 1916. It is the largest shovel operating on the Mesabi range. Work on this property started in September, 1915, and the pit shipped its first ore at the beginning of the present season. Butler Brothers are also stripping the Lamberton mine, a Great Northern property, located about 4 miles west of Hibbing, between the Stevenson mine and Carson lake. The pit now being excavated will be 700 to 800 feet long and 400 feet wide. The overburden depth varies from 30 to 60 feet. Two shovels are being used. This mine will be ready to ship about July 1.

J. Leonard Replogle, vice president of the American Vanadium Co., has been elected a director of the Wabash railroad.

Marvelous Facts

About the Production of Firearms at the Remington Plant

An idea of the magnitude of the business at the big plant of the Remington Arms-Union-Metallic Cartridge Co., in Bridgeport, Conn., in supplying arms for the Russian and French armies can be had when the figures are given of men employed and money involved. There are two contracts. One is from the Russian government for $100,000,000, and the other is from the French government for $50,000,000. It will require about two and one-half years to get through with the work, with 18,000 men working. Probably never in the history of the world has there been such an enormous quantity of arms made in one plant, and surely never such sums of money spent in a like time for small arms.

The factory is now running 24 hours a day, 9,500 men being employed. It is the plan to add 500 men a week until the full capacity is reached—18,000 men. Housing conditions are all that stand in the way of not using that number of men now. The Remington company is now engaged in building 500 modern stone and brick apartment houses and private dwellings, and future plans call for three times as many.

Although the maximum limit of production will be 5,000 rifles a day some time this summer or fall, it is hoped that the maximum will be 10,000 a day when conditions are such that the plant can be worked to its fullest capacity with every available inch of floor space being used for manufacturing. The latter number is possible, and may be reached before the end of the year. Rifles will not be the only product. Bayonets for the British government are being turned out, while rifles for the same government are being made at the Remington plants at Ilion, N. Y., and Dover, Del.

The steel used in the barrels and other rough steel parts of the rifles are being made by the Crucible Steel Co. The Gaynor Mfg. Co. has a sub-contract for the bullets for the 1,125,000 cartridges turned out by the Union Metallic Cartridge Co. weekly. These bullets are of a high quality bronze and contain 90 per cent copper. They are ground to needle points and are made for high velocity.

There is probably no other plant in the country so well guarded as the Remington plant. A regiment of 1,000 ex-United States army soldiers are used as guards, working in three shifts. These guards have strict orders to exclude all persons from the grounds. No one can enter even the employment office without stating the business, and all suspicious persons are held for examination.

Busy Plants

In Canada Turning Out Largest Production in Their History

Mark Workman, president of the Dominion Steel Corporation, who has recently returned from a tour of inspection to the company's properties, states that the present output is the largest in the history of the company. The steel production is sold right up to the end of the year. The rod, bar and nail mills are working to full capacity. The output of barbed wire has doubled in the last six months. The company has been offered extensive orders at attractive prices for delivery in 1917, but is not anxious to book ahead and cannot undertake nearby deliveries. Export orders for England and France are a large factor in present business and the domestic demand is improving. The coal business is hampered by the difficulty of procuring tonnage, and under present conditions the company is at a loss how to fill orders from the Montreal district. Many munition factories may in consequence suffer from a shortage of coal.

Bethlehem Buys Land

The Bethlehem Steel Co. has purchased a large block of land at Marquette street N. E. and Lakeside avenue, Cleveland. It is officially announced that this plot will be utilized for warehouse purposes, the company's present warehouse facilities being inadequate to take care of the business of the Cleveland district. A large stock of tool steels will be carried in the new warehouse, together with special machinery steels, rounds, squares, flats, etc. The land was purchased from the Willard Storage Battery Co., Cleveland, and the consideration is said to have been approximately $110,000. The ground purchased has a frontage of 330 feet on Lakeside avenue N. E., with a depth of 300 feet on Marquette street. The Bethlehem Steel Co.'s present Cleveland quarters are at 1264 Ontario street.

The United Zinc Smelting Co., recently organized under New York laws with a capital stock of $6,000,000, has purchased the Clarksburg Zinc Works, Clarksburg, W. Va., from the Pearlman Co., Inc. The United company also has purchased Kenefec Zinc Co., Joplin.

New Officers Elected

Iroquois Iron Co. Reorganization Completed—Rogers-Brown to Sell Product

Chicago, June 3.—Stockholders of the Iroquois Iron Co., control of which recently passed from its former owners to a syndicate largely interested in the By-Products Coke Corporation, at the annual meeting elected a new set of officers and directors to represent the new control. Ferdinand Schlesinger was chosen chairman of the executive committee. The Schlesinger interests control large coke properties in Milwaukee and the Northwestern Iron Co., at Mayville, Wis., as well as a large coke plant about to be constructed at St. Paul, Minn.

Charles P. Wheeler, of Pickands, Brown & Co., was elected president and treasurer, Charles T. Boynton, of Pickands, Brown, and the By-Products Coke Corporation, vice president, and Clifford D. Caldwell, of the By-Products Coke Corporation, secretary. Seymour Wheeler was chosen assistant treasurer. Donald S. Boynton second vice president and assistant secretary, and Charles A. Stillman assistant to the president. The directors are as follows: Charles T. Boynton, Harry Coulby, Clifford D. Caldwell, H. H. S. Handy, Clayton Mark, Anson Mark, Nathan L. Miller, Ferdinand Schlesinger, Armin Schlesinger, Edward G. Wilmer and Charles P. Wheeler.

Announcement is made that the company will continue its policies practically as heretofore, manufacturing various grades of pig iron for the merchant trade. No change will be made at this time in the selling arrangements and the product will be marketed through the Chicago office of Rogers, Brown & Co. The general offices will remain at their present location in connection with those of Rogers, Brown & Co., Corn Exchange building.

Large Extensions

Plans have been issued and bids are now being taken for the construction of large extensions to the plant of the Worth Bros. Co., Coatesville, Pa., general details of which previously were announced. The main mill building, 80 x 500 feet, is to be erected to include the new 8, 12 and 15-inch bar mills. Other improvements are to be carried out, including a 4-story office building, 60 x 112 feet. The Midvale Steel Co. also has prepared plans for a 2-story office building at Nicetown, Pa.

The Great War and Steel Exports

British View of International Trade as Affected by the Present Conflict of European Nations

BY E. T. GOOD

GERMANY, prior to the outbreak of the war, was exporting iron and steel at a rate of 6,000,000 tons a year, against Britain's 5,000,000 tons, and America's 2,000,000 tons. Only 15 years ago, Britain was exporting between four and five times as much as Germany. Since 1897, when the German syndicate adopted their famous export bounty policy, we have had the following record:

Exports of Iron and Steel, in Millions of Tons from—

	Britain.	Germany.	United States.
1897	3.3	0.7	0.5
1900	3.2	0.8	1.1
1905	3.7	3.3	1.0
1910	4.6	4.8	1.5
1913	5.0	6.1	2.0

Thus, under the bounty system, Germany had made enormous progress at the expense of Britain and America. In order to understand how the system worked it is necessary to observe that industrial syndication is more complete in the German steel trades than in any other important group of industries anywhere, and that German banks have extended financial assistance to the manufacturers and merchants in their efforts to capture foreign trade to extents unapproached by those in other countries. In Germany there has been a syndicate for practically every material and article of steel manufacture, from coal and iron ore to sewing machines and wire nails. Unlike the consolidated companies of America, German syndicates do not absorb or control any works, but simply regulate the production, prices, and sale of the articles manufactured. For example, a firm producing a dozen different articles will be a constituent of as many different syndicates, and not a unit of a single corporation. The various syndicates, strongly backed by the banks, have worked in wonderful harmony, considering the frequent conflict of interests, and they clearly reflect the military character and discipline of the German nation. In 1897 the coal, iron and steel syndicates adopted the policy of pushing their exports by means of bounties, or rebates, and this has had such a profound influence upon international competition that it is well worth treating in some little detail.

Mr. Good, the author of this paper, is a journalist of Sheffield, Eng. In a note to the editor of *The Iron Trade Review* enclosed with the manuscript, he says: "I'm off to the war, but anything posted here will reach me."

The syndicates controlling fuel, ore, pig iron and raw steel have supplied their associated customers—the steel rollers, manufacturers and engineers—with materials on the rebate principle when such materials have been worked up into manufactures for export. Thus, there would be a standard price, for, say, steel ingots; but if a firm used a thousand tons of ingots to make plates for export, a rebate would be granted on that quantity. The rebates have sometimes been as high as 40 cents per ton of coal, $2.50 per ton of pig iron, and $3.75 per ton of steel ingots, and so on. As a result, steel rails, for instance, have been sold abroad $7 below the ordinary market price as quoted in Germany. The rebates, or bounty rates as they are called, have been increased, decreased, or suspended in response to the fall or rise in the home demand. If home demand has been good, the rates have been low. If home demand has slackened, the bounties have been put up in order to promote "dumping" abroad rather than have plants idle at home. When general trade has been the slackest, German exports have increased the most.

As evidence of the volume of trade at stake, the following figures may be quoted:

Value of German Exports in Million of Marks*—

Articles.	1912.	1913.
Metals and Metal Goods	1,664	1,905
Machinery, Electro-technical products and conveyances	1,025	1,144
Animal, and vegetable, yarn goods, including textiles	1,464	1,560
Chemical products, colors and colored goods	824	956
Leather and leather goods, Hides and furs	512	553

*The mark equals, roughly, 25 cents or one shilling.

The exports of German machinery in 1913 were no less than 593,000 tons valued at 678,000,000 marks. The value of cotton and cotton goods exported was 535,000,000 marks; of wool and woolen goods, 444,000,000 marks; of silk and silk goods, 256,000,000 marks; whereas in every case Germany's imports of manufactures are comparatively insignificant. Of iron and steel goods she imports only one ton for every ten tons exported. Of machinery she imports only one ton for every seven exported. On the balance of trade—that is, balancing imports against exports—Germany had become, up to the outbreak of the war, the world's most aggressive competitor in manufactures, actually beating Britain, long regarded as the workshop of the world, and far outdistancing the United States.

With regard to the competition that may now spring up between Britain and America for some of the iron, steel and machinery business that has hitherto been done by Germany, it may be observed that while the United Kingdom enjoys the great advantages in geographical situation and shipping facilities, the United States has the benefit of positively enormous productive capacity in her iron and steel works. Not since the financial panic of October, 1907, have American steel works had anything like sufficient work to employ them adequately, until the present war time boom set in. Now, with a world's export trade in iron and steel goods and machinery of nearly 20,000,000 tons a year, and with the competitor lately taking nearly 7,000,000 tons of this business temporarily, if not permanently, out of the race, America's opportunity, like that of Britain, seems a splendid one.

Guns for Russia

Within three months the New England Westinghouse Mfg. Co.'s factory in Meriden, Conn., wil be turning out 1,000 rifles a day for the Russian government which will meet all the requirements which that government is demanding. The rifle is different from the ordinary Mauser rifle in minor details.

Machinery for the manufacture of these rifles is now being installed at the Meriden plant, which is at present making the ordinary Westinghouse model.

In testing the new Westinghouse model, Russian ammunition is used and the guns are inspected by Russian officers. The Westinghouse plants in Springfield and Chicopee, Mass., are already turning out these arms.

Purchase Plant.—The ship building plant of the Robert Palmer & Son Ship Building Co. at Noank, Conn., has been purchased by Charles W. Morse and associates after prolonged negotiations. It is expected that the plant will be re-equipped and placed in shape for the building of wooden and steel vessels of a larger type than heretofore.

Predicted Troubles Not Realized

EXPERIENCES at the Adams mine on the Cuyuna furnish striking examples of the fact that often borrowed troubles vanish when confronted by the real conditions—Actual operations have demonstrated that the water problem on this range is not nearly so serious as had been predicted some years ago

THE Adams mine is a characteristic and an excellent example of what the water problem has been in several cases in the Cuyuna district, and it is an interesting topic because the earlier investigators invariably predicted serious water troubles for Cuyuna operators, whereas, as a whole, it has been quite the reverse. The soil in the district, being prevailingly sandy, was considered to be a reservoir for underground waters; therefore, also likely to prove productive of treacherous flows of quicksand. The moranial topography of the country is dotted with hundreds of lakes, ponds, extensive marshes and swamps. At the Adams mine particularly, the situation appeared serious because several ponds are within a few hundred feet of the shaft and are co-extensive with large wet marshes hemmed in by hilly highland. Also, much of the drilling could be done only in the winter months of thick ice because the ore body crosses much of the wet ground.

A VIEW OF THE ADAMS MINE SHOWING THE EXTENT OF THE WORKINGS

The Adams mine property embraces the S½-NW¼ and NW¼-SW¼ of Section 30, 46-28, Crow Wing county, Minnesota, a 120-acre tract, the fee of which is owned by the Orelands Mining Co. and the mining lease by Cuyler Adams, of Deerwood, Minnesota, near which town the property is also located. No consumers of ore are interested in or affiliated with this operation, which is a personal undertaking of Mr. Adams, who has conducted much exploratory work in the district and has been identified with it since its discovery. In 1908 the Rogers-Brown Ore Co. first drilled and then leased the property, and followed by sinking a timber drop-shaft.

The ore body at the Adams mine shows up much better underground than by drill holes only, the latter being distributed somewhat irregularly. The Minnesota tax commission estimated this property to contain 906,357 tons averaging 55.86 per cent in iron, but substantial portions of it will average 58 to 59 per cent. The main ore body has a maximum width of 150 feet and in length may exceed 1,000 feet. The full depth of the ore body is unknown, but it averages at least 100 to 150 feet. The ore body and silica is low. This ore is typical and strikes northeast-southwest, and in some places dips slightly to the northwest and in others to the southeast.

Modern Equipment Installed

The ores are dark brown in color, and in texture are coarsely granular or lumpy, with some of it laminated. None from this mine have been used in a furnace. Moisture analyses have been found to be under 10 per cent in this part of the district. Wash ores or manganiferous ores are unknown in this mine.

The concrete shaft is equipped with a standard steel head-frame and steel sets. The power plant is small and very simple, as are the buildings, which are made of steel sheeting. The concrete chimney at the boiler house was the first of its kind in the district; it is 8 feet in diameter at the base and 105 feet high. There is only one other concrete chimney in the district. The pumping machinery consists of one 1,400-gallon electric plunger pump and one 1,000-gallon duplex compound steam pump, with two 500-gallon duplex sinker pumps in reserve.

Greenville Car Co.

The Greenville Steel Car Co., Greenville, Pa., has recently been reorganized and F. L. Fay, formerly general manager, has been elected president and has acquired the controling interest in the business. James G. Dimmick has been elected vice president.

Frank L. Fay, the new president of the company, has been treasurer and general manager of the Greenville Steel Car Co. and its predecessor, the Greenville Metal Products Co., since 1910. James G. Dimmick, the new vice president, was for some time in the construction department of the Pere Marquette. He has been engaged for some years in car construction work and in his new position will have charge of the production department and factory management.

Meeting of Hardware Men

Held at Pittsburgh June 2-3—Spelter Situation Held to be Delicate

SEVERAL papers of direct interest to the iron and steel trade were presented at the fifth annual meeting of the metal branch of the National Hardware Association of the United States, held at the William Penn hotel, Pittsburgh, June 2 and 3. More than 75 members of the organization and a large number of guests attended the business sessions, which were in charge of W. H. Donlevy, Carter, Donlevy & Co., Philadelphia, chairman of the metal branch.

W. A. Cook, New York representative of Matthiessen & Hegler Zinc Co. La Salle, Ill., and William M. McFate, secretary of the Trumbull Steel Co., Warren, O., presented valuable papers on the spelter situation. Mr. Cook outlined the growth and the development of the spelter industry in an interesting historical sketch. Mr. McFate spoke on "Spelter and Its Relation to Galvanized Sheets."

A Delicate Situation

Notwithstanding the fact that spelter today is selling at a price less than it commanded a year ago, Mr. McFate pointed out that quotations on galvanized sheets are still far above normal. Mr. McFate expressed the belief that the price of spelter would not go back to its normal position until after the end of the war. He described the present situation as a "delicate and dangerous one, as all connected with the manufacture and the sale of galvanized sheets have realized from the beginning."

The initial meeting was opened Friday morning by Mr. Donlevy, and after a report of the metal committee, Capt. Charles W. Brown, vice president of the Pittsburgh Plate Glass Co., Pittsburgh, spoke briefly about the business outlook. He declared that he did not believe there ever was a time in history when any nation had as good a business outlook as we have at present. He predicted that prosperity would continue for a long time, barring some unforseen complication. The greater part of the morning was devoted to informal discussions of market conditions.

At the afternoon session, the spelter situation was discussed by Mr. Cook and Mr. McFate, after which the question of costs was considered. Quincy W. Wales, Brown-Wales Co., Boston, spoke about three methods of remunerating salesmen.

Clifford E. Pierce, the Betz-Pierce Co. Cleveland, pointed out the necessity of maintaining accurate cost systems. Walden C. Nimmo, E. L. Parker & Nimmo Co., Baltimore, discussed "Possible Methods of Reducing Expense Accounts" and F. A. Wilkening, Standard Metal Co., Indianapolis, Ind., led a discussion entitled "What Can We do Individually to Keep Up With the Rising Cost of Distribution?" "The Abuse of Terms," was discussed in an interesting manner Friday afternoon by R. H. Yansey, Berger Mfg. Co., Canton, O., and G. H. Jones, vice president, Inland Steel Co., Chicago. The latter, who was unable to be present, submitted a letter which was read by the secretary. Charles Coolidge Parlin, manager, division of commercial research, Curtis Publishing Co., Philadelphia, was the principal speaker at a buffet supper and smoker Friday night, which was in charge of Louis Follet, president, Standard Tin Plate Co., Cannonsburg, Pa. Mr. Parlin declared that quality today is the foremost requisite in merchandizing products of any kind.

Questions relating to the sale of terne plates and sheet metals, the investigation by jobbers of the merits of new sheet metal products and the adoption of effective methods of advertising products of individual members, were discussed at the Saturday morning session. John Follansbee of Follansbee Bros. Co., Pittsburgh, discussed a subject entitled "By What Method Can the Association Increase the Sale of Terne Plate and Sheet Metals as Roofing Materials?"

Honesty of Jas. J. Hill

(*Chicago Record-Herald, May 30.*)

A father in the railroad Israel and a great American has passed away in the death of James J. Hill. It would be difficult to name a man of the present generation whose counsels were heard more gladly by his fellow citizens and who commanded a wider confidence and respect.

He was a great railroad builder, who built railroads on the land and for the people they were to serve, and not on the stock exchange and for the manipulation of speculators. He was forever a puzzle to the stock exchange speculator. No one ever heard of "graft" in connection with his name; when it was thought that "graft" had been heard of the hearing proved bad for those whose ears were so attuned.

For instance: Some years ago Mr. Hill bought a great block of iron ore lands. He bought with his own money and credit. He was under no more obligation to turn them into the assets of the Great Northern railroad than would have been a purchaser wholly unconnected with the railroad. That, however, was what he bought them for, to assure traffic for the railroad and stability of income for its stockholders. With Darius Miller, then head of the Burlington, he arranged that should he die before the transaction could be completed these lands should go to the Great Northern.

When certain astute gentlemen on Wall street heard that Hill's purchases of ore lands were to be turned over to the Great Northern's stockholders they formed certain conclusions which were, perhaps, based on what had been or would be their own methods in such a case. They assumed that Mr. Hill had acquired some property which was not especially valuable, and was "unloading" it on the Great Northern. They acted on that assumption, to their subsequent financial chagrin, and even distress.

New Ore Record

May Shipments on Great Lakes Exceed All Previous Records

Ore shipments during May on the Great Lakes established a new record for monthly shipments, being 8,449,580 tons as against 8,204,416 tons moved during July, 1913, which was the previous high mark. During May, 1915, 5,012,359 tons were shipped, a decrease of 3,437,221 tons from the shipments of May, 1916. The movement to June 1 of the present year was 10,107,991 tons, an increase of 4,591,799 tons over the corresponding period during 1915, and an increase of 1,957,392 tons over the movement to June 1, 1913, which was the banner year in the history of the ore trade. The total ore movement for the year 1913 was 49,070,478 tons. If shipments during the balance of the present season equal those of 1913, the total movement for 1916 will be in excess of 51,000,000 tons.

Following are the shipments by ports, with comparative data for 1915:

Port.	May, 1915.	May, 1916.
Escanaba	479,259	1,045,186
Marquette	178,927	561,555
Ashland	513,715	955,041
Superior	763,889	1,722,341
Duluth	1,974,321	2,671,044
Two Harbors	1,102,248	1,494,413
	5,012,359	8,449,580
1916 increase		3,437,221

Port.	To June 1, 1915.	To June 1, 1916.
Escanaba	528,566	1,443,400
Marquette	183,365	614,813
Ashland	557,665	1,102,893
Superior	851,064	1,933,681
Duluth	2,149,310	3,209,325
Two Harbors	1,246,222	1,803,879
	5,516,192	10,107,991
1916 increase		4,591,799

Midvale Again Boosts Tool Market

Sun Ship Building Co. Issues List of Yard and Shop Equipment—
Interborough Rapid Transit in Market for Cranes

THE improved activity of last week continues to characterize the machinery market. Most of the requirements now being placed, however, involve equipment on which the trade has figured for some time, and the volume of new inquiry is comparatively small. The most important business continues to originate with the Midvale Steel & Ordnance Co., which has not yet concluded purchasing on its list. This company already has awarded contracts involving fully $400,000 worth of machine tools, and is expected to place fully as much more before it retires from the market. Most of its requirements, as previously noted, embrace large lathes, planers, profilers and like machines. The Sun Ship Building Co., Morris building, Philadelphia, finally has issued a formal list of the punching and shearing machinery which it will require for the new ship building plant it is erecting at Chester, Pa. This list is the largest of its kind issued in years and involves 18 or 19 punches and shears of varying types and capacities. This list is expected to be closed without delay. The Sun company during the week sent out requests for machine tool catalogs and, as a result, it is expected that the formal requirements for machine tools will be prepared and issued shortly. Some important business recently was placed by a prominent citizen of New York, who is presenting a vocational training school to the village of Chazy, N. Y. The business placed involved all the machine tool equipment which is to be installed immediately, and later additional equipment will be placed. The school is to be known as the Central rural school, Chazy, N. Y., and it is to be erected at once at a cost of about $500,000. The Essex county vocational school commission, Wesley A. O'Leary, director, Newark, N. J., is taking bids on six lathes, two grinders, a shaper, a milling machine, two drill presses, motors, and miscellaneous equipment, to be installed in a training school at West Orange, N. J. The demand for equipment for making time fuses continues to be brisk. The Keytone Watch Case Co., Riverside, N. J., and several other concerns are in the market for machine tools for this purpose.

The Union Pacific and the Rock Island railroads have entered the market during the week for small requirements. The Southern Pacific has put out inquiries for some additional equipment. In addition to the above business, a large total was built up by small machine tool orders originating from a variety of domestic concerns. Further foreign buying, particularly by representatives of Russian concerns, is reported, but in general the foreign demand is quiet. The Carpenter Steel Co., Reading, Pa., placed orders for several cranes and is expected to close for a few more within a few days. The Interborough Rapid Transit Co., New York, is in the market for five 30-ton traveling cranes; H. G. Stott, engineer, 600 West Fifty-ninth street, is taking the bids. Mark & Mohl, Third avenue and Sixth street, Brooklyn, are in the market for a gate shear to cut ¼-inch plates, 10 feet long, at one stroke.

Bids are being taken on some heavy rolling mill equipment for a large English steel works. It is understood inquiries for similar equipment shortly will be put out in this market by other English concerns.

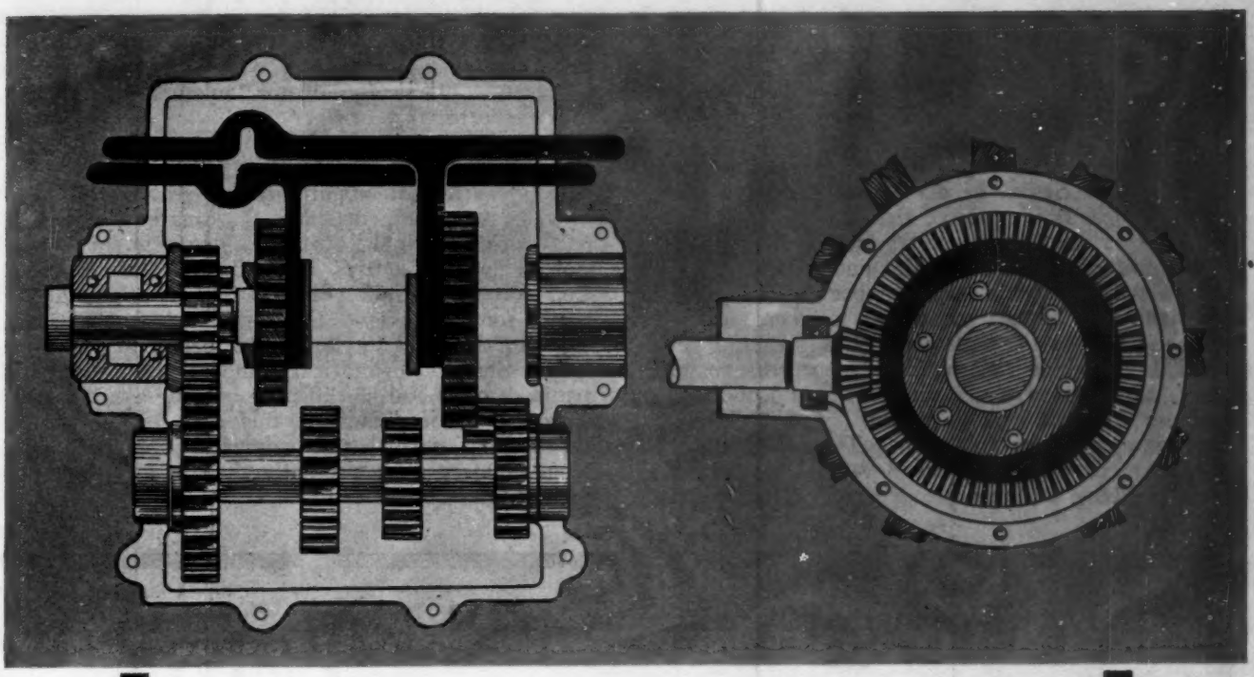
The American Locomotive Co., will build a foundry at Schenectady, N. Y. The American Steel & Wire Co. is about to build a galvanizing addition at Worcester, Mass. The Ball & Roller Bearing Co., Danbury, Conn., is expected to award contracts shortly for the erection of a new plant. The Western Electric Co. has let the structural contract for a warehouse in Boston. The United Wire & Supply Co., Auburn, R. I., is about to double its capacity. The S. S. E. Co., a new concern, Twenty-third and Market streets, Philadelphia, has purchased 20 acres and will begin work immediately on the erection of a plant which will have capacity for turning out 1,500 automobiles annually. The Keystone Steel & Ordnance Co., H. S. Lembert, 709 North Sixty-third street, Philadelphia, has purchased a warehouse at Swedesboro, N. J., and plans to equip it for the manufacture of shells. The Schatz Mfg. Co., Poughkeepsie, N. Y., has let the structural contract for a ball bearing manufacturing plant. The Adder Machine Co., Kingston, Pa., has let the structural contract for an addition.

Chicago Market Slumps Slightly

UNUSUALLY slack business is being felt in the Chicago machine tool market, the activity of several weeks past having diminished to a certain degree. Two holidays in one week will account for a portion of this recession. Inquiry which had been of a general nature has relaxed and only scattering business is being done. The railroads are still considering bids on the several lists current in the Chicago territory but only the Union Pacific has come to the point of closing. The requirements of this line have just been placed with dealers. Inquiry for lathes has undergone a change in the past few months. For a long time the sizes most wanted were 18-inch to 24-inch and many plants went into the manufacture of this size almost exclusively. At present smaller and larger sizes seem most in demand and the medium sizes are obtainable for prompt delivery. The sale of about 60 tools at the plant of the Goetz Co., manufacturer of brewery and bottling machinery, was completed a few days ago. Prices were higher in many cases than the original cost of the tools.

Mill Equipment Features Pittsburgh Market

HEAVY demand for rolling mill equipment continues to be the outstanding feature of the market at Pittsburgh. The announcement that the Mark Mfg. Co., Evanston, Ill., has prepared plans for a complete tube mill at Indiana Harbor, Ind., came as a surprise to builders of mills and furnaces, since no general inquiry for equipment had been made in the open market. Not many weeks ago, it will be recalled, the National Tube Co. sent out preliminary specifications for some of the equipment for its new pipe mill at Gary, Ind., but only a small part of the machinery involved has been purchased. The machine tool market is comparatively quiet. Demand for machinery for the manufacture of war material is being revived,



For Tremendous Strains

SUCCESSFUL automobile manufacturers are using "AGATHON" STEELS for all places where tremendous strains are liable.

The *Transmission Gears* are a very vital part of a machine—therefore, to guard the reputation of his name and of his products, he specifies "AGATHON" STEELS. He also uses "AGATHON" STEELS for *axles, crank shafts, drive shafts, connecting rods,* etc.

"AGATHON" STEELS are specially prepared for just such purposes—that's why they are so superior.

Let us send you a trial order

AGATHON STEELS

"AGATHON" Chrome Nickel	"AGATHON" Vanadium
"AGATHON" Chrome Vanadium	"AGATHON" Silico-Manganese
"AGATHON" Nickel Steels	"AGATHON" Chrome Steel
"AGATHON" Special Analyses	"AGATHON" High Carbon

Our shipping facilities are favorable to speedy delivery anywhere

THE CENTRAL STEEL COMPANY

MASSILLON, OHIO

Detroit Office: 326-27-28 Ford Bldg., F. Walter Guibert, District Representative
Cleveland Office: Hickox Bldg. - The Hamill-Hickox Co., District Representative
Chicago Office: Room 1511-12 Lytton Bldg., 14 East Jackson Blvd., A. Schaeffer, District Representative

although no orders of importance have been placed in western Pennsylvania recently.

Russia Buys Cincinnati Tools

THE Russian government has purchased about 1,000 electric portable grinders and drills from various manufacturers in Cincinnati, at an aggregate cost of $75,000, deliveries to be made over the third quarter of this year. It is reported that this buyer is after a much larger number of similar tools, if deliveries can be guaranteed. The Cisco Machine Tool Co., Cincinnati, which has been a large shipper of lathes to Italy since the war began, has closed a recent order for engine lathes with that country aggregating about $20,000. Machine tool builders report that inquiries have fallen off to a certain extent, and that future business does not look as promising as it did during the first quarter of this year. The strike of union machinists in Cincinnati has developed no new features. Striking workmen are gradually returning to the shops, and day forces are now fully as large as they were before the strike was renewed May 1. Night shifts are smaller than they were last April, but this is because practically all machinists are showing a preference for day work.

Cleveland Market Maintains Position

NO inquiries of importance have been received in the Cleveland machine tool market during the past week though the amount of business concluded is thoroughly satisfactory. The Firestone Tire & Rubber Co., Akron, has not yet closed on the list which it issued some time ago. Save for single inquiries coming into the local territory, the feeling of quiet prevails. Shapers, cylindrical grinders and radial drills are in demand and no difficulty is being experienced in disposing of machines of this sort. Deliveries are approaching normal and shipments are being made from builders more promptly than at any time prior to hostilities abroad.

New Constuction and Equipment

What it is **Where it is** **Who's doing it**

Among New England Factories

BOOTHBAY HARBOR, ME.—The Nickel Plating & Galvanizing Co. has been incorporated with $10,000 capital; to do an electroplating and galvanizing business. The incorporators are W. E. Sawyer, president; J. W. Dearborn, treasurer, and Winthrop Davis.

CLINTON, ME.—The Magnet Knitting Mill has awarded contracts for a 2-story, 75 x 250-foot addition to its plant and for machinery equipment.

CORINNA, ME. — Burrill & Clark are building a 1-story and basement, 60 x 140-foot addition to their weave shed, which will be equipped with new machinery.

PORTLAND.—Keating & Shaw have been incorporated with 10,000 capital to make motor vehicles. The incorporators are Howard E. Shaw, Herbert J. Welch and Ralph L. Keating, Newton Mass.

RUTLAND, VT.—Plans for rebuilding the plant of the Patch Mfg. Co., which is making shrapnel shells, will be figured. The proposed building will be of brick and steel, 1-story, 64 x 133 feet.

BOSTON. — Morris Gutlon will build a brick and stone, 3-story, store and office building at 27-35 Exchange street.

BOSTON. — The Massachusetts Machinery Co. has been incorporated with $50,000 capital by J. P. King, H. K. Merrow and J. W. Greer.

BOSTON.—A contract has been awarded for a reinforced concrete, 6-story, 66 x 72-foot store and loft building at Kneeland and Tyler streets.

BOSTON.—Joseph Newman will build a reinforced concrete, 6-story, 66 x 72-foot store and loft building to cost $175,000 at 882-892 Washington street.

BOSTON.—The Monarch Metal Mfg. Co. has been incorporated with $100,000 capital by Harry Sebell, George E. Jordan Jr., and Charles M. Wheaton.

BOSTON.—The Boston Scale & Machine Co. has been incorporated with $300,000 capital by Donald M. Hill, Charles L. Favinger and Dana T. Gallup.

BOSTON.—The Harry M. Hope Engineering Co. has been incorporated with $10,000 capital, by Harry M. Hope, president and treasurer; J. Richardson Jr., and D. L. Hope.

BOSTON.—The Western Electric Co. has leased 43,000 square feet at Summer, C and Fargo streets. On this site a 3 and 4-story, 105 x 212-foot warehouse will be erected. The structural contract has already been let.

BOSTON.—The Summer Street Extension Trust will build a reinforced concrete, fireproof, 3 and 4-story, 105 x 212-foot building at Summer and C streets, at a cost of $250,000. The new building will be occupied by the Western Electric Co.

CHARLTON, MASS.—A fire in the mill of the Worcester Wadding Co. damaged the building and machinery with a loss of $17,000.

CHELSEA, MASS. — Atwood & McManus have awarded a contract for a brick, 3-story, 50 x 38 x 150 foot addition to their factory on Vale street.

FITCHBURG, MASS.—The Grant Yarn Co. has awarded a contract for a brick, 3-story, 60 x 250-foot storehouse to cost $15,000, on River street.

HOLYOKE, MASS.—William Gagnon will build a brick, 5-story building to cost $60,000 on lower High street.

HOLYOKE, MASS.—George W. Prentiss & Co., wire makers, will build a brick, 5-story building for light manufacturing purposes to cost $60,000 at Dwight and Front street.

LYNN, MASS.—The Campbell Electric Mfg. Co. has let a structural contract for a 6-story and basement, 58 x 110-foot electrical supply manufacturing plant.

MEDFORD, MASS.—The city of Medford will build a steel, stone and cement, 3-story city hall on Main street.

MEDFORD, MASS.—The city of Medford will build a 17-room high school to cost $125,000 at Park and Washington streets.

NEW BEDFORD, MASS.—The New Bedford Gas & Electric Co. has started work on the erection of a power plant to cost $250,000.

PITTSFIELD, MASS.—The J. W. Hanlon Co. will build a brick, 3-story 80 x 195-foot, business block on Federal street.

SALEM, MASS.—The Burgess, Lang & Co., Boston, is preparing plans for a reinforced concrete and steel, 8-story, 50 x 200-foot factory.

SALEM, MASS.—J. M. McCarthy & Son have purchased the site of the T. H. O'Shea plant on Grove street which was recently burned and will erect a factory on it.

SALEM, MASS.—The Associated Tanners' Machinery Co. has been incorporated with $50,000 capital, by John W. O'Donnell, president; Frederick R. Barker, Boston, treasurer, and George M. Foster.

SPRINGFIELD, MASS.—A. H. Phillips has awarded contract for a brick, 45 x 180-foot theater building to cost $20,000 at Sumner avenue and Dickinson street.

WORCESTER, MASS.—The American Steel & Wire Co. has completed plans for a 1-story addition to its galvanizing plant. The addition will contain about 3,000 square feet.

WORCESTER, MASS.—The Clark university will build a cement, brick and steel, 3-story, 60 x 100-foot, chemical laboratory building to cost $40,000 on its Main street property.

WORCESTER, MASS. — The Norton Co. has awarded a contract to the E. J. Cross

Crawford Ore from the Dean-Itasca Mine on the Mesabi Range

The ore is non-bessemer, of good coarse structure. Dean-Itasca mine shipments for 1915 were 486,374 tons, mostly since August 1. For 1916 they will be considerably greater.

A complete analysis of Crawford Ore from Dean-Itasca Mine in natural state and dried at 212° Fahr.

	Dried 212°	Natural
Iron	58.35	50.2451
Phosphorus	.065	.05597
Silica	6.03	5.1924
Manganese	1.00	.8611
Alumina	3.40	2.9277
Lime	.16	.1377
Magnesia	.12	.1033
Sulphur	.031	.0266
Volatile Matter	5 74	4.9427
Moisture	13.89	

Crawford Ore Guarantee for 1916, 51.50 Per Cent Iron, Natural

The output of this mine during 1916, together with our five other mines, gives us an unusually large tonnage.

We are now taking contracts for this ore and will be glad to figure on your requirements for the coming season.

THE TOD-STAMBAUGH COMPANY

Perry-Payne Building

CLEVELAND :: :: :: :: OHIO

Co. for a concrete, brick and steel plant to cost $500,000 on its Gleason avenue extension, Greendale.

PROVIDENCE, R. I.—The International Braid Co. will build a brick, mill-construction, 4-story and basement, 71 x 160-foot mill at its Elmwood mills on Dabois and Mawney streets.

BRIDGEPORT, CONN.—The Bead Chain Co. will build a reinforced concrete and steel, 2-story, 60 x 100-foot factory at State and Mountain Grove streets.

BRISTOL, CONN.—The Bristol Brass Co. will build a 60 x 300-foot and a 60 x 200-foot addition to its plant.

HARTFORD, CONN.—W. W. Walker and Russell P. Taber have awarded a contract for a brick, 3-story, 46 x 180-foot, business block to cost $75,000 on Allyn street.

HARTFORD, CONN. — The Philbrick-Booth Foundry Co. has been incorporated to make castings. The new company is capitalized at $20,000 by Halsey B. Philbrick and H. R. Philbrick, both of Hartford, and Thomas T. Booth, Worcester, Mass.

MIDDLETOWN, CONN.—The H. Wales Lines Co., Meriden, Conn., has been awarded a contract to erect a brick, stone and steel, fireproof, 1-story, 86 x 109-foot, bank building, to cost $60,000, for the Middletown National bank on Main street.

NEW HAVEN, CONN.—The Star Trim & Millwork Co. has been incorporated with $25,000 capital by Louis Berman, Moyer Sofer and Maurice Podoloff.

NEW HAVEN, CONN.—The Connecticut Co. has awarded a contract to the J. C. White Engineering Corporation, New York, for a steam power station, with an ultimate capacity of 100,000 kilowatts. Two substations will probably be built for the distribution of the current.

WALLINGFORD, CONN.—Lewis A. Miller has been awarded a contract for a brick, stone and steel, 5-story, 123 x 140-foot high school to cost $143,000, at South Main and Prince streets.

From the Alleghenies to the Sea

BAYONNE, N. J.—The Vacuum Oil Co. has taken bids through its engineer, L. D. VanLeuven, on the structural contract for an oil-refining plant to cost about $2,000,000. The plant will comprise piers, warehouses, steel tanks, a power house, a machine shop and other buildings.

BROOKLYN, N. Y.—Mark & Mohl, Third avenue and Sixth street, are in the market for a gate shear to cut ¼-inch plates, 10 feet long, at one stroke.

BUFFALO.—The Donner Steel Co., which recently placed orders for cranes for its new plant, is taking bids on some of the machine tool equipment.

BUFFALO.—The Cold Spring Storage Co. plans to build a $100,000, 7-story, 60 x 150-foot, addition to its plant at 1432 Main street. G. Norton Wolfe, architect, Henkel building, is preparing the plans.

BUFFALO, N. Y.—The Mey Chain Belt Co. has been incorporated with $10,000 capital to manufacture chains, belting and hoisting machinery. The incorporators are H. F. Mayer and K. H. Mayer.

JAMESTOWN, N. Y.—The Merrimac Metal Products Co. has been incorporated with $60,000 capital to manufacture engines, etc. The incorporators are F. R. Andrews, W. C. Serfell and C. F. Fauch.

KEYPORT, N. J.—The Aeromarine Plane & Motor Co. of which Winston Paul, Times building, New York is president, has taken over the Robbins brick yard property, comprising 60 acres. A building, 120 x 300 feet will be erected at once. The company, which operates a plant at Nutley, N. J., in the manufacture of aeroplane and marine motors, will make aeroplanes at the new factory.

LONG ISLAND CITY, L. I.—The Theo Realty Co. has sold a site on Tenth street near Vernon avenue to Chas. Tatham and Walter Brodie, of New York, who will erect a modern factory building.

LONG ISLAND CITY, L. I.—The Degnon Realty & Terminal Improvement Co., 30 East Forty-second street, New York, has let a structural contract for a 4-story, 100 x 350-foot warehouse and garage building at Long Island City. This structure will be occupied by the New York Couch Bed Co., 418 West Twenty-fifth street, New York.

NEWARK, N. J. — A contract has been awarded for the erection of a 1-story, brick addition, 50 x 100 and 15 x 100 feet, to the plant of Kraeuter & Co., tool manufacturers, 583 Eighteenth avenue.

NEWARK, N. J.—The Martin Dennis Co. is erecting a large plant near the junction of the Hackensack river and the New York and Greenwood Lake branch of the Erie railroad. The plant will cost about $50,000.

NEWARK, N. J.—The North American Copper Co., 52 Vanderbilt avenue, New York, is taking bids on the structural contract for a plant to be erected on a site fronting 690 feet on the Hackensack river. The plant is expected to cost about $100,000.

NEW YORK.—The Pyrene Mfg. Co. has put out some machine tool inquiries.

NEW YORK.—The American Car & Foundry Co. is inquiring for heavy lathes and other equipment for making 9.2-inch shells.

NEW YORK.—The Central railroad of New Jersey has let a contract for the erection of a round house at Communipaw, Jersey City.

NEW YORK.—The Southern Pacific railroad has put out additional machine tool inquiries. The amplified list includes several hydraulic presses.

NEW YORK. — The Interborough Rapid Transit Co., H. G. Stott, engineer, 600 West Fifty-ninth street, is in the market for five 30-ton, electric traveling cranes.

NEW YORK.—The Universal Tool & Die Works has been incorporated with $6,000 capital by J. Kraviess, A. W. Levin and H. Stele, 1,656 Washington avenue.

NEW YORK.—The Thorner Mfg. Co. has been incorporated to manufacture architectural iron. The new company is capitalized at $20,000 by A. Schnitzler, and E. and B. D. Thorner.

NEW YORK.—The Nathan Mfg. Co., which has taken a contract for time fuse parts from the American Locomotive Co., has put out inquiries for some additional machine tool equipment.

NEW YORK.—The Wells Machinery Corporation has been incorporated with $2,000 capital to manufacture machinery. The incorporators are G. C. Sprague, I. W. Bonner, and J. W. Crandell.

NEW YORK.—The Adams Mining Machinery Corporation has been incorporated with $35,000 capital to manufacture mining machinery. The incorporators are H. S. Gould, W. Belcher and H. Adams, New London, Conn.

POUGHKEEPSIE, N. Y.—The Schatz Mfg. Co. has let a contract for the erection of a 2-story, 60 x 160-foot, ballbearing plant.

SCHENECTADY, N. Y. — The American Locomotive Co. will build a 1-story, 100 x 175-foot foundry addition.

SYRACUSE, N. Y.—The Onondaga Steel Co. has been incorporated with $150,000 capital by S. S. Buckley, E. D. and E. R. Newkirk.

TROY, N. Y.—The Marine Propeller & Engine Co. has been incorporated with $50,000 capital. The incorporators are L. M. Foster, W. S. Newton and J. W. Reddy.

BLOOMFIELD, N. J.—Fries & Bro., 92 Reade street, New York, are clearing a site on which they will erect a chemeical plant. It will comprise two factory buildings, an office and a power house.

CAMDEN, N. J.—The Victor Talking Machine Co. has contracted with Irwin & Leighton, Philadelphia, for a 6-story, 76 x 203-foot addition at Delaware avenue and Market street.

CAMDEN, N. J.—The Meadows Machine Works has been incorporated to manufacture iron and steel. The new company is capitalized at $25,000 by F. R. Hansell, J. A. MacPeak and C. L. Clow.

JERSEY CITY, N. J.—The Wickes Machinery Co. has been incorporated to manufacture machinery with $120,000 capital by Frank A. Fitzgerald, James B. Hamilton, E. F. Weilbacher, Jersey City.

JERSEY CITY, N. J.—The United Core Drilling Co. has been incorporated to construct tunnels. The company is capitalized at $10,000 by A. B. Shanahan, Patrick J. Healey, Floyd Ramsey, Jersey City.

NEW BRUNSWICK, N. J.—The Manufacturers' Iron & Steel Corporation has been incorporated at Albany, N. J., with $8,000,000 capital to purchase the Never-Slip Mfg. Co., New Brunswick, and the Dryden Horseshoe Co., Catasauqua, Pa. The directors of the corporation are James W. Johnson, William J. McCurdy and Robert C. Nicholas, New Brunswick, N. Morley Holten, Catasauqua, and Herman Gustow, New York.

PASSAIC, N. J.—The Passaic Tire Co. has been incorporated with $25,000 capital by H. Morris, G. Morris, Y. Evansky, Passaic, and H. Evansky, Wallington.

PATERSON, N. J.—The Industrial Paint Works contemplates erecting a 3-story, 60 x 104-foot factory.

PAULSBORO, N. J. — The Vacuum Oil Co., which recently bought punching and shearing machinery for a new tank shop, is now inquiring for the remainder of the equipment for this plant.

PERTH AMBOY, N. J.—The Perth Amboy Chemical Works will erect a 2-story addition, 45 x 150 feet, of steel construction with reinforced concrete floors. The contract has been awarded to the Luther P. Fluhrer Co., New York.

POINT-NO-POINT, N. J. — The Public Service Electric Co. has prepared plans for a $150,000 addition to its big Essex power plant at Point-No-Point.

KINGSTON, PA.—The Adder Machine Co. has let a contract for the erection of a machine shop extension, two stories, 81 x 115 feet, to cost $35,000.

MARCUS HOOK, PA.—The Benzol Products Co., a subsidiary of the General Chemical Co., New York, has let contracts for the erection of two additions to its analine dye factory at Marcus Hook.

MIDLAND, PA.—The Crucible Steel Co. of America is in the market for some rolling mill equipment.

PHILADELPHIA.—The Pennsylvania railroad has put out inquiries for additional ma-

Personal Chats With

ROLLING MILL JIM

Say fellows, little old New York is some town. Just got back from the Iron and Steel Meeting. Didn't meet much iron and steel, but did meet a lot of old friends and good fellows. All the way home felt like Monday morning in the mill, but began to recover when I got to the plant and found all the housings full of HUBBARD ROLLS and running smooth as grease. I tell you right now when you want to get away from the Mill you've got to have something reliable in the housings or the little boy in the blue uniform is liable to be handing you one of those yellow slips that busts up the "Pee-rade."

So long—

Rolling Mill Jim.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

chine tools, including two large hydraulic presses.

PHILADELPHIA.—The Ross-Tacony Crucible Co., Tacony, Philadelphia, is adding about 3,000 square feet of floor space to its brass crucible department.

PHILADELPHIA.—The Midvale Steel & Ordnance Co. has let a structural contract for machine shop No. 7, which is to be a 3-story, 154 x 540-foot structure.

PHILADELPHIA. — The Pennsylvania Equipment Co. is in the market for a 20-ton, double-truck crane, 4-foot x 8½-inch gage, 40 to 50-foot boom, equipped with a grab bucket.

PHILADELPHIA.—The Pennsylvania Ship Building Co., Pennsylvania building, is taking preliminary figures on the machine tool equipment for its new ship building plant at Gloucester, N. J.

PHILADELPHIA.—The Keystone Steel & Ordnance Co., in which H. S. Lembert, 709 North Sixty-third street, is interested, has purchased a large warehouse at Swedesboro, N. J., and contemplates making alterations in order to manufacture shells and other war munitions.

PHILADELPHIA.—The Sun Ship Building Co., Morris building, has put out one of the largest inquiries for punching and shearing machinery which has even appeared. It involves 18 or 19 large punches and shears of various types and capacities, the orders for which are expected to be awarded without delay. This equipment will be installed in the new plant which the company will erect at Chester, Pa.

PHILADELPHIA.—The S. S. E. Co. which recently opened an office at Twenty-third and Chestnut streets, has purchased a 20-acre site at Erie avenue and B street from the Pennsylvania railroad and will erect a plant for the manufacture of automobiles. Much of the equipment will be of special design. The plant is expected to begin operation about Sept. 1, and will have an initial output of about 1,500 cars a year. Those interested in the new company are E. E. Smathers, 304 West Seventy-fifth street, New York; C. B. Shaffer, Chicago, and Victor Lee Emerson, formerly of Alexandria, Va.

PITTSBURGH. — The engineering department of bureau of public works has prepared plans for a concrete bridge on Greenfield avenue, to cost $120,000. Robert Swan is the city engineer.

PITTSBURGH.—The National Tube Co. will erect a power plant to be equipped with gas engines to supply several large additions recently made, including new open hearth furnaces. Another plant for the refining of benzol will be added.

READING, PA.—The Carpenter Steel Co. has awarded a contract to the Lewis F. Shoemaker & Co. for the erection of a machine shop which will require about 400 tons of fabricated steel.

SOUTH BETHLEHEM, PA.—The Bethlehem Steel Co. has asked bids on a small list of machine tool equipment.

TARENTUM, PA.—The Penn Steel Co. has begun the erection of a plant at Tarentum for the manufacture of steel for use in the interior of battleships. Three buildings will be built on a 7-acre site.

WASHINGTON, PA. — J. Underwood, county controller, will receive bids for the following bridges: Fry bridge in Finleyville borough, a plate girder, 60-foot span, with concrete abutments; Van Voorhis bridge, a through-truss, 86½-foot, concrete abutments, in Fallowfield township and the Smallwood bridge in East Pike Run township, a 66-foot, reinforced concrete arch.

YORK, PA.—The Standard Chain Co. plans to build additions to its plant at Princess street and the Maryland and Pennsylvania railroad.

NEW CASTLE, DEL.—The Baldt Steel Co. is in the market for several cranes.

Activities in the Central States

AKRON, O.—The General Tire & Rubber Co. (formerly the Western Rubber & Tire Co.) of Kansas City, Mo., has increased its capital from $200,000 to $500,000 and will erect a large addition to its plant.

ATHENS, O.—Howell & Thomas, architects, 151 East Broad street, Columbus, will receive bids on a factory, 200 x 400 feet, 1-story and basement, for the McBee Bindery Co., C. D. McBee, president, Smith street, Athens. The cost of the proposed structure is $35,000.

CANTON, O.—The Wooster and Canton plants of the Hinderer Brothers, patternmakers and manufacturers of steam and hot water boilers, will consolidate as the Canton Pattern & Foundry Co. and will erect a plant on Twenty-second street. The foundry will be 1-story, 60 x 85 feet and the pattern building will be two stories, 50 x 60 feet; both buildings will be of brick and concrete.

CENTRAL CITY, O.—The West Newark Foundry & Furnace Co. has been incorporated with $25,000 capital by C. W. Cunningham, C. E. McCracken, H. H. Shanck, and N. E. Jones.

CINCINNATI.—The J. Baum Safe & Lock Co. has been incorporated with a capital stock of $180,000. This company manufactures iron safes and locks.

CINCINNATI.—Power plant, heating and ventilating equipment will be needed by the board of education of Reading, a suburb of Cincinnati, for a new school building to cost $75,000.

CINCINNATI.—Power plant equipment will be needed by the Sullivan Printing Works Co., which will build a new plant 35 x 94 feet, three stories, as an addition to its present plant on Gilbert avenue.

CINCINNATI.—The Cincinnati & Suburb Bell Telephone Co. will erect a new building on Woodburn avenue, to cost $100,000. About 450 tons of structural and reinforcing steel will be needed.

CINCINNATI.—Application for a building permit has been made by the Lunkenheimer Co. for a pattern building and foundry. The former will be 50 x 100 feet, four stories high, and the latter 100 x 350 feet, and one story.

CINCINNATI.—The plant of the F. H. Lawson Co. will be 193 x 217 feet, for which equipment will be needed. The company will manufacture automobile accessories in connection with its present line of sheet metal specialties.

CINCINNATI.—Work on the new Y. M. C. A. building to cost $350,000 has been temporarily postponed, because bids exceed the appropriation allowed the building committee. This work will require about 1,800 tons of structural steel and re-inforcing bars.

CLEVELAND.—Donn & Demming, architects, 808 Seventeenth street, N. W., Washington, D. C., have prepared plans and are taking bids for a $75,000, experimental labratory for the Grasselli Chemical Co.

CLEVELAND.—The Masters & Mullen Construction Co., 602 Electric building, has received a contract from the White Sewing Machine Co. for the erection of an addition to its plant on East Seventy-ninth street. The addition will be 1-story, 90x 250 feet, brick construction and will cost $45,000. G. H. Smith, 131 Colonial arcade, is the architect.

CLEVELAND.—The Cleveland Milling Machine Co. is erecting a $50,000 plant on Euclid avenue at Green road. The first building of the new plant will be 125 x 300 feet. In the near future this building will be surrounded on three sides by a U-shaped building 100 feet wide and about 2,000 feet long. F. S. Shields is president of the company.

COLUMBUS, O.—The Columbus Malleable Iron Co. is erecting a $60,000 plant on Fields street. It will be 1-story, steel uonstruction.

COLUMBUS, O.—Equipment will be purchased by the Columbus Malleable Iron Co., for an addition to its plant which will cost $50,000.

COLUMBUS, O. — The Shaw Wire Fence Co., S. G. Shaw president, has purchased a site on Reynolds avenue and will move its business here from Warsaw. A new concrete and steel factory will be built.

DAYTON, O.—Equipment is being purchased by the Dayton Engineering Laboratories Co., for an addition to its plant, which will be erected soon.

DAYTON, O. — The commissioners have awarded a contract to the Toledo Bridge & Crane Co. for the super-structure of the New river bridge at West Carrolton at their bid of $33,000.

DESHLER, O.—The city of Deshler contemplates the erection of a power plant to cost $20,000. George Champe, Nashby building, Toledo, is the engineer in charge.

NORWOOD, O.—The United States Can Co. will build two additions to its plant. One will be an office building, 45 x 45 feet, and the other, a storage house, 36 x 80 feet.

TOLEDO, O.—The Toledo City Foundry Co. has been incorporated with $10,000 capital. The incorporators are J. C. Burt, J. Holzscheiter, E. Holzscheiter, A. and R. C. Burt.

WEST ALEXANDER, O.—The Twin Valley Light & Power Co. has been incorporated with $20,000 capital by A. M. Fudge, J. E. Flora, A. E. Brubaker, W. A. Nock and C. E. Stiver.

YOUNGSTOWN, O. — The Standard Car Equipment Co., Masury, O., has awarded a contract to the William McIntyre & Son Co. for a $20,000, brick, 2-story, office building.

ZANESVILLE, O.—The $50,000 bond issue voted on at a recent election, will be used to construct a pumping station. W. W. Roach is the director of public works.

ZANESVILLE, O.—W. J. Heck has awarded a contract for an addition to the plant of the Dockery Brass & Iron Co. The new building will be brick, two stories, and 40 x 48 feet.

HUNTINGTON, W. VA.—The Huntington Boiler Works has been incorporated with $5,000 capital by J. A., E. B. and M. Diddle, B. F. and E. France, all of Huntington.

ELKHART, IND. — The Lawndale Mfg. Co. has been incorporated to manufacture automobile parts with $75,000 capital, by James A. Bell, Andrew H. Beardsley and William H. Foster.

INDIANAPOLIS, IND.—The Miller-Pedlow Co. has been incorporated with $2,000 capital to manufacture boilers, tanks, etc. The incorporators are W. F. Miller, R. Pedlow and T. Schiller.

INDIANAPOLIS, IND.—The Central Plating & Mfg. Co. has been incorporated to manufacture plating devices. The new com-

pany is capitalized at $10,000, by Henry H. Higert, E. A. Cooper and D. B. Higert.

INDIANAPOLIS, IND. — The Laporte Foundry & Furnace Co. has been incorporated with $50,000 capital. The incorporators are G. W. Gilderman, W. N. Rumely, C. E. Wolfe and A. J. Hickey.

ALGONQUIN, ILL. — The Peters Brass Mfg. Co., maker of tapping chucks, will build an addition costing $15,000.

AURORA, ILL.—The Aurora Metal Cabinet Works will build a factory at Aurora.

AURORA, ILL.—Frank D. Chase, architect, 122 South Michigan avenue, Chicago, is taknig bids on a general contract for a factory for the Lyon Metallic Mfg. Co., manufacturer of metal lockers, etc. The proposed building will be 1-story, 100 x 160 feet.

CARROLLTON, ILL.—Bids will be received until June 20, by A. H. Johnson, city clerk, for a 250-gallon per minute, triplex pump, a kerosene engine, an air compressor and fittings.

CHICAGO.—The Ryan Car Co., Brandon avenue and 135th street, is building a powerhouse, 37 x 200 feet, to cost $15,000.

CHICAGO. — The Automatic Air Furnace Co. has been incorporated with $10,000 capital by R. W. Dunn, A. V. Brown and E. S. Thompson.

CHICAGO. — The Independent Can Co., Kinzie and Wood streets, will build a 2-story factory, 25 x 115 feet, to cost $20,000.

CHICAGO.—The Chicago Die & Specialty Co. has been incorporated with $2,400 capital by John Stowick, Morris Brull and Joseph C. Klein.

CHICAGO.—The Cole Mfg. Co., stove manufacturer, 3218 South Western avenue, is building an addition, three stories, 150 x 185 feet, to cost $75,000.

CHICAGO.—The American Boiler & Tank Co., 2734 Hillock street, has been incorporated with $5,000 capital by Edgar J. Phillips, J. Leahy and L. M. Betts.

CHICAGO.—The Joy Ball Bearing Co. has been incorporated with $60,000 capital by Charles H. Joy Jr., Alfred Geahart and Charles H. Joy Sr., 4727 Malden street.

LIBERTYVILLE, ILL. — The American Wire Fence Co. is remodeling its factory and will install additional equipment.

ANN ARBOR, MICH.—The Hoover Steel Ball Co. will build an addition, 40 x 400 feet. L. J. Hoover is general manager of the company.

BAY CITY, MICH.—The Roeller Foundry Co. will build a plant at North Water and Trumbull streets.

DETROIT.—The Siswch Bros., manufacturers of dies, jigs and tools, will build an addition to their plant at 75 Baltimore avenue.

DETROIT.—The Ireland & Mathews Mfg. Co., 51 Iron street, manufacturer of sheet metal goods, will build a plant at Beard and Green streets.

DETROIT. — The Wadsworth Mfg. Co., manufacturer of automobile bodies, will build a 2-story factory, 95 x 350 feet, costing $60,000. W. C. Rowling, 1256 East Jefferson avenue is secretary of the company.

DETROIT. — The Springfield Metal Body Co. has purchased a site in Detroit, upon which it will erect a large plant for making automobile bodies. The main building will contain 500,000 square feet of floor space.

GRAND RAPIDS, MICH.—The National Tire Chain Co. has been incorporated with $35,000 capital by C. W. Hodge, J. Verwys and J. H. Eckert.

HOWELL, MICH. — The Spencer-Smith Machine Co., manufacturer of pistons, is building an addition, 40 x 100 feet.

MUSKEGON, MICH.—The L. O. Gordon Mfg. Co., manufacturer of cam shafts and motor specialties, will build a factory at Muskegon.

SAGINAW, MICH.—The Werner & Pfleiderer Co., manufacturer of special machinery, will build an addition.

BEAVER DAM, WIS. — The Malleable Iron Range Co. will build a 1 and 2-story addition, 50 x 200 feet. A. G. Hill is president of the company.

CHIPPEWA FALLS, WIS.—The Wisconsin-Minnesota Co. has been granted a permit for a hydro-electric plant at Chippewa Falls.

CLINTONVILLE, WIS.—The Four Wheel Drive Automobile Co. will build an addition to its factory, 100 x 175 feet.

GREEN BAY, WIS.—The Automatic File & Index Co., which recently established a department for manufacturing steel interiors for files and cabinets, is building a 2-story, 40 x 100-foot, factory addition.

KENOSHA, WIS.—The Thomas B. Jeffery Co., builder of automobiles and motor trucks, is building additions to cost $250,000, which include a 40-ton, gray iron foundry, 120 x 250 feet, 5 stories.

LaCROSSE, WIS.—The light and power station of the Wisconsin-Minnesota Light & Power Co. at LaCrosse was damaged by fire with a loss of $75,000. The plant will be rebuilt.

MANITOWOC, WIS. — The Aluminum Goods Mfg. Co., which has under construction a 5-story addition, 50 x 300 feet, is about to start another addition, 50 x 150 feet. George Vits is president of the company.

MILWAUKEE.—Plans have been approved for a bascule bridge over the Milwaukee river, at a cost of $180,000.

MILWAUKEE, WIS. — It is reported that the Milwaukee Coke & Gas Co. is planning to add a battery of 240 coke ovens to its present plant in Milwaukee.

MILWAUKEE, WIS.—The Schlesinger interests are establishing a coke and gas plant at St. Paul, the Western States Coke & Gas Co. having been organized several months ago, as noted, for this purpose.

MILWAUKEE.—The Badger Wire & Iron Works, which was recently incorporated, will build an addition, 105 x 140 feet, of steel and concrete, to cost $20,000. Equipment to be installed will be individual motor-driven.

MILWAUKEE.—The Badger Wire & Iron Works is preparing plans for the erection of a factory addition to cost $20,000. It will be a 1-story, 140 x 150-foot, brick, concrete and steel building with composition roofing and steel sash.

MILWAUKEE, WIS.—The city of Milwaukee has accepted the bid of John F. Casey Co., Pittsburgh, Pa., for constructing the west side, low-level sewer for $470,441. The work includes 300 feet of 72-inch, cast iron, water pipe, to be purchased by the contractor.

MILWAUKEE, WIS.—The Wisconsin Telephone Co., 183 Fifth street, will take bids about June 12, for the construction of an exchange on Broadway. This building will be eight stories, 120 x 120 feet. The steel contract, awarded to the Wisconsin Bridge & Iron Co., Milwaukee, has been previously noted. Six electric passenger elevators are included in the requirements.

SUPERIOR, WIS.—John B. Barsdale, 618 Tower avenue, is planning to build a $50,000 plant for the manufacture of motor trucks.

GALENA, MO.—The Andrews Brothers will let contracts soon for the construction of a 200-ton concentrating mill at Galena.

JOPLIN, MO.—The Bedell Motor Car Co., recently incorporated with $12,000 capital stock, will build a machine and repair shop. A. T. Blackwell of Joplin is interested.

Chips from the Machine

The Superior Foundry Co. will soon begin operations on its new plant at Holland, Mich.

* * *

The Western Machinery Co., Cincinnati, has moved from Sixth and Baymiller streets to larger quarters in the Burnet house, Third street.

* * *

The Crane Co., Chicago, has presented an exhibit of mechanical fittings and valves, valued at $1,500, to the college of engineering, University of Wisconsin and a similar gift to Purdue University.

* * *

The Malleable Iron Range Co., Beaver Dam, Wis., has given nearly $200,000 in life insurance to its employes.

The receivers of the Bon Air Coal & Coke Co., Robert Vaughn and E. C. Lewis, have blown in a furnace at Allena Creek, Tenn.

* * *

The Nova Scotia Steel Co. is establishing a large ship building plant at New Glasgow, N. S.

* * *

The Han-Yeh-Ping Co. of China will build a branch iron works at Tayeh, China. New machinery has been purchased and will be transported to China at once.

* * *

The American Car & Foundry Co., Chicago, has contracts from the Italian government for 1,000 box cars and 2,000 gondola cars.

The American Locomotive Co., New York, has closed a contract with the British government for 2,200,000 time fuses. This contract involves about $9,000,000.

* * *

The Philadelphia chamber of commerce announces that a $10,000,000 automobile company will establish a plant at Philadelphia. The new concern will be known as the Emerson Motor Car Corporation.

* * *

The Carnegie Steel Co. has awarded a contract to the Morgan Engineering Co., Alliance, Ohio, for several electric cranes to be used in its McDonald plant at Youngstown, Ohio.

In the South and Around the Gulf

RICHMOND, VA. — The Wise Acetylene Gas Machine Co. has been incorporated with $50,000 capital by H. M. Wise and V. B. Brown.

BRISTOL, TENN. — The Robinson Slide Valve Co. has been incorporated with $150,000 capital to manufacture railroad engine valves. The incorporators are M. Bird, M. Herman and F. P. Robinson.

CHATTANOOGA, TENN.—The Tennessee Power Co. proposes to extend a transmission line to Benton, Tenn., and construct a substation at that point.

CHATTANOOGA, TENN. — Plans for a $70,000 addition to the plant of the Chattanooga Warehouse & Cold Storage Co. have been prepared by W. T. Downing, Atlanta, Ga.

CHATTANOOGA TENN. — The Public Light & Power Co. has started to reconstruct its power plant on Duck river near Manchester. A transmission wire will later be extended to Lewisburg, Tenn.

COLUMBIA, TENN.—The Columbia Water & Light Co., J. S. Robinson, secretary and superintendent, is contemplating the installation of a 500-horsepower prime mover with a 500-horsepower generator and electrically-driven pumps with 1,000,000-gallon a day capacity.

CROSSVILLE, TENN.—The Skaggs-Reagan Co., Helena, Tenn., has a contract to construct and equip an electric light plant at Crossville.

GREENEVILLE, TENN. — Improvements to the water system, proposed by the city, include a standpipe and extensions to cost $9,000. C. H. Bewley is the superintendent.

MEMPHIS, TENN. — The Pidgeon-Thomas Iron Works, Memphis, has been awarded a contract for 90,000 tons of 4 and 6-inch, cast iron pipe, by the Artesian water department.

MEMPHIS, TENN.—The Buckeye Cotton Oil Co. has let a contract to the Kaucher-Hodges Contracting Co. for the construction of a $100,000 reinforced concrete, feed mill.

MORRISTOWN, TENN.—The Hamblen and Grainger county commissioners have awarded a contract for the Tulley's bridge to the Virginia Bridge & Iron Works. The bridge will cost $17,000.

UNION CITY, TENN.—The city will expend $15,000 in improvements of its water system.

ANCHOR, KY.—Electric hauling and mining machinery will be installed by the R. C. Tway Coal Co. at Anchor.

LOUISVILLE, KY. — The plant of the Louisville Cooperage Co., recently damaged by fire at a loss of $150,000, will be rebuilt, according to J. H. White, president of the company.

HEBER SPRINGS, ARK.—The Arkansas Hydro-Electric Development Co. has been incorporated with $50,000 capital. A. R. Amos, Little Rock, Ark., is president of the company. The company is considering two projects; a 150-foot dam across Little Red river at Heber Springs, or a 60 and an 80-foot dam near Heber Springs, for generating electric current for Little Rock, Memphis and other cities.

MARIANNA, ARK.—The Arkansas Light & Power Co. will install electrically driven, centrifugal pumps at the water works.

JEANNERETTE, LA.—Daniel Jeffrey & Sons, have been incorporated to manufacture boilers. The new firm is capitalized at $10,000 by Dan Jeffrey, Robert W. Jeffrey and Dan F. Jeffrey.

WINNSBORO, LA.—The Carl Shipp Electric Light & Power Co. is inquiring for prices on 40-horsepower diesel oil engines, or 40-horsepower Fairbanks-Morse & Co. engines.

BEAUMONT, TEX.—The Oil City Brass Works has been incorporated with $5,000 capital by G. E. Bryant, C. J. Ficken and F. L. Pivoto.

BRASHEAR, TEX.—The Brashear Threshing Machine Co. has been incorporated with $3,000 capital by W. E. Christian, G. W. Moncrief and W. P. Parker.

EL PASO, TEX.—The Moore-Schillinger Co. has been incorporated to manufacture ornamental iron and iron work. The new concern is capitalized at $2,000, by C. E. Schillinger, F. B. Moore and H. E. Christie.

HOUSTON, TEX. — The county commissioners are planning a steel and concrete bridge over Bray's bayou at Harrisburg, at a cost of $17,000.

ARDMORE, OKLA.—In accordance with an agreement with the commercial and business clubs of Ardmore, the Pioneer Telephone Co. will expend about $100,000 on the erection and equipment of a modern telephone exchange.

TULSA, OKLA.—S. Gallais, 804 South Detroit street, is having plans prepared by A. W. Black & Son, architects, Security building, St. Louis, for a 10-story hotel and theatre building, 140 x 150 feet, to cost $600,000.

WELCH, OKLA.—The city of Welch, F. D. Pilsue, mayor, is having plans prepared by the McIntosh-Walton Engineering Co., Oklahoma City, for a waterworks plant, costing $24,000.

Western and Intermountain Territory

NEWTON, KAN. — The city commission will have another pipe line constructed from Newton to the Mission water works between Newton and Halstead. The estimated cost is $50,000.

KEARNEY, NEB.—The Omaha Structural Steel Co. has been awarded a contract for the erection of a concrete and steel bridge across the Platte river south of Kearney. The structure will be 1,000 feet long with 20 spans and will cost $44,350.

GLENDIVE, MONT.—The city of Glendive has voted $65,000 in bonds for the construction of a water system.

GREAT FALLS, MONT.—Grant Smith & Co., Seattle, have been awarded a contract for constructing a 20-stall, brick and concrete roundhouse at Great Falls for the Great Northern Railroad Co. at a cost of $75,000.

GREAT FALLS, MONT.—The Great Falls Ornamental Iron & Wire Works has been organized to manufacture ornamental and structural iron and wire work, by J. L. Ricker, E. E. Ricker and O. B. Kotz, all of Great Falls.

HARLOWTOWN, MONT. — Bids will be received by S. K. Campbell, city clerk, up to June 15 for the construction of a waterworks and sewer system at Harlowtown. The work will include the furnishing of a motor, pump, steel tower and tank, fire hydrants, water pipe, pumping station and equipment.

MILES CITY, MONT.—County commissioners plan the erection of a steel bridge over Powder river, to cost $15,000, and four bridges over the Tongue river. H. E. Pearnall is county engineer.

CASPER, WYO.—The Titan Engine Co., recently incorporated, will build a machine shop and foundry at Casper.

DENVER.—The Mountain Iron Foundry Co. will build an addition to its foundry, 50 x 170 feet. W. J. Westfall, 313 Colorado building, architect, is taking bids on the work.

CASA GRANDE, ARIZ.—The city of Casa Grande will build a municipal electric light plant, for which $30,000 in bonds has been voted.

OATMAN, ARIZ.—Bids will be received until June 15 by C. L. Mayhen, secretary of the Mojave-Oatman Water Co., for a waterworks and sewer system to cost $250,000 to $300,000.

Pacific Coast and Western Canada

CALEXICO, CAL.—Plans are under way for enlarging the waterworks system and pumping plant of Calexico. Lloyd Prewitt is superintendent.

OCEAN PARK, CAL.—H. W. Schluette, president of the Great Western Amusement Pier Co., is having plans prepared by A. B. Rosenthal, 504 Lankersheim building, Los Angeles, for a 10-story hotel, 200 x 250 feet, to cost $1,000,000.

OCEANSIDE, CAL.—The Santa Fe Railroad, C. W. Felt, chief engineer, Chicago, will build a steel bridge over the San Luis river, costing $80,000.

SACRAMENTO, CAL.—The Pacific Coast Steel Co. has inquired for a 75-ton, ladle crane.

BREMERTON.—Bids will be received until June 20, by the bureau of supplies and accounts, navy department, Washington, D. C., for a 40-ton, traveling crane at the Puget Sound navy yard.

NEWPORT, WASH.—Notice has been received by the county commissioners at Newport that the government has approved the construction of a steel suspension bridge over the Coeur d'Alene river.

NORTH YAKIMA, WASH.—The Pacific Power & Light Co. will build a concrete sub-station at North Yakima, to cost $75,000.

SEATTLE.—The Leach Bros. will build a 1-story foundry, which will require new equipment.

SEATTLE. — The Washington Shipping Corporation has authorized the construction of two, 2,500-ton ships of the schooner type, equipped with auxiliary power, designed to carry 1,500,000 feet of lumber.

SEATTLE.—The port commission of Seattle is in the market for a 35-ton, locomotive crane for Smith Cove pier, to cost $16,000.

SPOKANE, WASH.—The Merchants' Cen-

tral Heating Co. was awarded a contract for installing an ornamental lighting system on Grand boulevard at a cost of $45,120.

VANCOUVER, WASH.—The Western Scale Co., recently incorporated, will construct a plant at Vancouver. John B. Easter of Vancouver is interested.

VANCOUVER, WASH. — The Motorboat Construction Co. has been incorporated with headquarters at Vancouver by Merrill A. Reed, S. S. Hewett and D. C. Zimmerman, who represent California capitalists. Ebson S. Shock, New York, is to be the supervising architect for the new plant.

JOSEPH, ORE.—The Oregon, Washington Railroad & Navigation Co. will build three bridges requiring two, 80-foot, girder spans, three, 20-foot, deck-plate spans and two, 40-foot, deck-plate, girder spans, to cost $36,000.

LA GRANDE, ORE.—Bids are being received by the M. J. Hursen Co., Globe building, Seattle, for the electrical work, steel and iron work and the sheet metal involved in the construction of the $40,000 roundhouse for the Oregon-Washington Railroad & Navigation Co. at La Grande.

PORTLAND, ORE.—The Northwest Steel Co. will build a 1-story addition to its plant at a cost of $7,500.

PRINCE GEORGE, B. C.—The city council proposes to install a power plant and may call for tenders in the near future. J. A. Turner is clerk to the council.

CALGARY, ALTA.—The Canadian Automatic Thresher & Machinery Co. is planning to build a plant at Calgary. W. J. Thomas and A. J. Lormer, Vancouver, B. C., are interested.

New Business in Eastern Canada

WINNIPEG, MAN.—A contract to erect a building for the Stovel Engraving Co. to replace the one that was recently damaged by fire, has been let to the Fort Garry Construction Co. The cost of the work is estimated at $160,000.

ALLISTON, ONT. — The Benedict-Proctor Mfg. Co. is in the market for a 50-horsepower engine and a 75 or 80-horsepower boiler.

CAMPBELLFORD, ONT.—The citizens of Campbellford have voted a loan of $30,000 to the Northumberland Paper & Electric Co. to assist it in the rebuilding of its plant recently destroyed by fire. The company is now constructing a large plant.

CHATHAM, ONT.—The American Pad & Textile Co. will build a $30,000 addition to its plant on Jeffrey street.

ELMIRA, ONT. — The Colonial Knitting Co. will build a factory at Elmira and will install machinery in the plant at a cost of $25,000.

ELMIRA, ONT.—The Elmira Planing Mill Co. has been incorporated to build and operate planing mills, saw mills, etc. The concern is capitalized at $40,000 by William J. Letson, Woolwich, Ont., Jacob Bauman, Emanuel G. Martin and others, Elmira. The company will shortly commence to erect a large planing mill at Elmira.

ESSEX, ONT.—E. C. Dennert, address Hill Brothers, Essex, Ont., will build a factory at Essex for manufacturing auto tractors, etc.

GALT, ONT.—The Goldie & McCullock Co., manufacturer of engines, boilers, machinery, condensers, etc., will build an addition to its plant to cost $100,000.

GALT, ONT.—The Shimer Cutter Head Co. of Canada, has been incorporated to manufacture cutterheads, machine knives, etc. The new company is capitalized at $50,000, by Frederick H. Palmer, Edward M. Worth, Robert Pollock and others, of Galt.

GANANOGUE, ONT. — The town council will make extensions to the waterworks plant and system to cost $15,000. S. McCammon is clerk of the council.

HAMILTON, ONT.—The Grasselli Chemical Co. has prepared plans for the erection of an addition to its plant on Burlington street to cost $18,000.

HAMILTON, ONT.—Two additions are being built to the plant of the Dominion Sheet Metal Co. at Hamilton, one 20 x 100 feet and the other 40 x 80 feet.

HAMILTON, ONT.—The Canadian Drawn Steel Co. has been incorporated with $500,000 capital to manufacture iron and steel, by Robert N. Hope, Henry J. Waddie, Sanford D. Biggar and others of Hamilton.

HAMILTON, ONT. — The Hamilton Ship Building & Ferry Co. has been incorporated to build boats, ships, ferries, etc. The new concern is capitalized at $100,000 by John G. Gauld, Ewart B. Binkley, Cecil V. Langs and others, Hamilton.

NIAGARA-ON-THE-LAKE, ONT.—The town council will have electrically driven pumps installed in connection with its waterworks system.

ORILLIA, ONT.—The town will expend $80,000 in the installation of new machinery in the power house at Swift Rapids on the Severn River. The equipment will consist of two 1,600-horsepower units with provision for the installation of any additional units that may be required.

OTTAWA, ONT.—Grant, Holden & Graham are receiving tenders for the erection of a factory to be of brick construction and cost $30,000. James Mather, 110 Wellington street, is the architect.

OTTAWA, ONT.—It is officially announced that the Lyall Construction Co. of Montreal, has been awarded a contract for rebuilding the Parliament buildings. The cost of the construction is understood to be upwards of $5,000,000.

OTTAWA, ONT.—The Sanitary Heating & Ventilating Co. has been incorporated with $50,000 capital to manufacture electrical and heating appliances, hardware and machinery, by Alfred E. Adams, Otto G. J. O'Regan and Joseph E. Barker, of Ottawa.

PEMBROKE, ONT.—C. Tessier, Box 965, Pembroke, is in the market for a compound, marine, steam engine, high-pressure cylinder, 5 x 7-inch stroke.

PENETANGUISHENE, ONT.—The Dominion Stove & Foundry Co. will make extensive additions to its plant and install machinery to manufacture furnaces.

PETERBOROUGH, ONT. — The Rudkin Brass & Iron Co. will shortly install a considerable amount of new machinery in its plant. William Rudkin is manager of the company.

PORT HOPE, ONT.—The Port Hope File Mfg. Co. has been incorporated, to carry on the business of machinist, iron founder and file maker. The new company is capitalized at $40,000 by William G. Brown, William Embleton, Edwin H. Fogarty and others, Port Hope.

PRESTON, ONT.—The Electrical Fittings & Foundry Co. has been incorporated with $48,000 capital to manufacture electrical machinery and appliances castings and fittings. The incorporators are Elizabeth Knox, Emma P. King and Mary E. Cherrier, of Toronto.

SIMCOE, ONT.—The Unique Shoe Co. has secured a loan of $20,000 from the municipality and will build a factory at once.

ST. CATHARINES, ONT.—The McKinnon Dash Hardware Co., St. Catharines, will have a plant to cost $75,000 erected on Ontario street. Sherwood & Sherwood, Mail building, Toronto, are the contractors.

ST. CATHARINE'S ONT. — The Globe Shock-Absorbing Tire Co. of Canada, has been incorporated to manufacture a shock-absorbing automobile tire with $1,000,000 capital. The incorporators are Isaac Normandy, Howard J. Ecclestone, Clarence L. Rolls and others of St. Catharines.

STRATFORD, ONT.—The city council will make extensive additions to the electric distribution plant to cost $30,000. R. R. Lang is clerk of the council.

STRATFORD, ONT.—The R. M. Ballantyne Co. will build a power house at Stratford to cost $10,000, and will install engines, boilers and other accessories.

STRATFORD, ONT.—The public utilities commission is making arrangements for the installation of machinery and the remodeling of its buildings. The work will cost $35,000.

SUDBURY, ONT.—The town council is having plans prepared by Victor L. Morgan, Wilson Greenwood building, for a power station on David street, to be of brick, concrete and steel construction and to cost $15,000.

TIMMINS, ONT.—Machinery will be required for the additions to be made to the plant of the Hollinger Gold Mines, at Timmins. The additions and machinery will cost $750,000.

TORONTO, ONT.—Toronto harbor commissioners will build a machine shop on the Don division near Mill street, at a cost of $13,000.

TORONTO, ONT.—The Majestic Electric Co. has been incorporated with $50,000 capital by J. A. Campbell, R. E. Callehan and A. L. McLellan.

TORONTO, ONT.—The Martin Pump & Machine Co., 43 Davies avenue, will build a factory at the corner of Broadview and Wilton avenues, to cost $10,000.

TORONTO, ONT.—The T. Eaton Co., 190 Yonge street, will build a large mail order building at Bay Side park, to cost about $1,000,000. J. C. Eaton is president of the company.

TORONTO, ONT.—A permit has been issued by the city architect to the Gutta Percha Rubber Co. for the construction of a reclaiming plant at the head of West Lodge avenue, to cost $30,000.

TORONTO. — Ont. Majestic Electric Co., Ltd., has been incorporated with $50,000 capital to manufacture electric, gas or other heaters, by Alex L. MacLennan, Roderick MacLennan, Toronto, and Richard E. Callahan, San Francisco.

TORONTO, ONT.—The Kilgour Davenport Co. has been incorporated to manufacture metal castings, furniture, etc. The new company is capitalized at $100,000 by James P. MacGregor, Albert E. Wilson, William Keenan and others, Toronto.

TORONTO, ONT.—The Disappearing Propeller Boat Co. has been incorporated to build boats and operate a machine shop. The new company is capitalized at $45,000 by Frank W. Callaghan, Neil H. Wilson, Newton H. Brown and others of Toronto.

TORONTO, ONT.—The Arnot Construction Co. has been incorporated to carry on the business of a public and private contractor, manufacture all kinds of metals and conduct the work of a foundry and machine shop. The new concern is capitalized at $40,000 by David Arnot and Oliver Rouse, Toronto, and John B. Nicholson, Hamilton.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Lower price to July 1; higher to Jan. 1.)

Bessemer valley	$21.00 to 21.50
Bessemer, Pittsburgh	21.95 to 22.45
Basic, Pittsburgh	18.95 to 19.20
Basic, eastern Pa.	19.50 to 20.00
Basic, Buffalo	19.00 to 19.50
Malleable, Pittsburgh	19.45 to 19.95
Malleable foundry, Chicago	19.50
Malleable foundry, Philadelphia	21.50 to 21.75
Malleable foundry, Buffalo	18.50 to 19.00
No. 1X foundry, Philadelphia	20.75 to 21.25
No. 2 foundry, Pittsburgh	19.45 to 19.70
No. 2 foundry, Cleveland	19.30 to 19.80
No. 2 foundry, Ironton	18.25 to 19.00
No. 2 foundry, Chicago	19.00
No. 2X foundry, Philadelphia	20.25 to 20.75
No. 2X foundry, N. J. tidewater	20.50 to 21.00
No. 2X foundry, Buffalo	18.50 to 19.00
No. 2 plain, Philadelphia	19.75 to 20.25
No. 2 plain, N. J. tidewater	20.00 to 20.50
No. 2 plain, Buffalo	18.25 to 18.75
No. 2 southern, Birmingham	14.75 to 15.00
No. 2 southern, Cincinnati	17.65 to 17.90
No. 2 southern, Chicago	19.50 to 20.00
No. 2 southern, Phila. delivery	20.00 to 20.50
No. 2 southern, Cleveland	19.00 to 19.50
No. 2 southern, New York docks	19.00 to 19.50
No. 2 southern, Boston docks	19.25 to 19.75
No. 2 south. interior, New Eng.	20.00 to 21.00
No. 2 southern, St. Louis	18.40 to 18.90
Virginia No. 2X, furnace	18.50 to 19.00
Virginia 2X, Philadelphia	21.25 to 21.75
Virginia, No. 2X, Jersey City	21.00 to 21.50
Virginia 2X, Boston points	21.75 to 22.25
Gray forge, eastern Pa.	19.00 to 19.50
Gray forge, Pittsburgh	18.95
Gray forge, Birmingham	13.75 to 14.00
Silveries, 8 per cent, furnace	26.00 to 29.00
Silveries, 8 per cent, Chicago	31.50
Low phos. Standard, Phila.	34.00 to 35.00
Low phos. Lebanon, Pa. furnace	30.00 to 32.00
Low. phos. Pittsburgh	30.00 to 31.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	19.75 to 22.25
Charcoal, Buffalo	21.00 to 22.00
Charcoal, Birmingham	22.50 to 23.00

IRON ORE

Lake Superior Ores.
(Lower Lake Ports.)

Old range Bessemer, 55 per cent, ton	$4.45
Mesabi Bessemer, 55 per cent, ton	4.20
Old range non-Bess., 51½ per cent, ton	3.70
Mesabi non-Bess., 51½ per cent, ton	3.55

Eastern Ores.
(Per unit delivered eastern Pennsylvania.)

Pt. Henry fur., 60 per cent, unit.	8.5c to 8.9c
Local N. Y. and N. J. ores, unit.	8.5c to 8.75c
Port Henry lump, at mines, ton.	$4.00

Foreign Ores.
(Per unit Philadelphia.)
(Prices nominal.)

Foreign Bess., 50 to 65 per cent	8 to 8½
For'n non-Bess., 50 to 65 per cent	8 to 8½

COKE

(At the ovens.)

Connellsville furnace	$2.50 to 2.75
Connellsville fur., contract	2.50 to 3.00
Connellsville foundry, contract	3.50 to 3.75
Connellsville foundry	3.00 to 3.50
Wise county furnace, contract	3.00 to 3.25
Wise county foundry, contract	3.50 to 3.75
Pocahontas foundry, contract	3.25 to 3.75
Pocahontas furnace, contract	3.00 to 3.25
New River foundry, contract	3.75 to 4.25
New River furnace, contract	3.25 to 3.50

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, seaboard, prompt	$250 to 300
Ferro manganese, 80 per cent, seaboard, contract	175
Spiegel, 20 per cent, fur. early and last half	60.00
Ferro-silicon, 50 per cent, Phil.	83.00 to 85.00
Ferro-silicon, 50 per cent, Pbgh.	83.00 to 85.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $32.00; 10 to 11 per cent, $33.00; 11 to 12 per cent, $34.00; 12 to 13 per cent, $35.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billet, Phila.	$50.00 to 55.00
Forging billets, Phila.	65.00 to 70.00
Forging billets, Pbgh., nominal.	65.00 to 70.00
Forging billets, Chicago	65.00
Wire rods, Pittsburgh (nom.)	60.00 to 65.00
Bessemer billets, Youngstown	42.00 to 45.00
Bessemer billets, Pittsburgh	42.00 to 45.00
Open hearth billets, Pittsburgh	42.00 to 45.00
Open hearth billets, Youngstown	42.00 to 45.00
Bess. sheet bars, Youngstown	42.00 to 45.00
Op. h'th sheet bars, Youngstown	42.00 to 45.00
Bess. sheet bars, Pittsburgh	42.00 to 45.00
Open hearth sheet bars, Pbgh.	42.00 to 45.00
Muck bar, Pittsburgh (nominal)	40.00 to 45.00

SKELP

Grooved steel skelp	2.50c
Sheard steel skelp	2.75c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bess. rails, Pbgh. & Chg. delivery after May 1, 1917	$33.00
Stan. op-h'th rails, Pbgh. & Chg. delivery after May 1, 1917	35.00
Light rails, 8 to 10 lbs., Pbgh.	50.00
Light rails, 8 lb., Chicago	43.00
Light rails, 12 to 14 lbs., Pbgh.	49.00
Light rails, 12 lbs., Chicago	42.00
Light rails, 16 to 20 lbs., Pbgh.	48.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to:—	
Boston docks (r. ad w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York, (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

Light rails, 16 to 20 lbs., Chgo.	$41.00
Light rails, 25 to 45 lbs., Pbgh.	47.00
Light rails, 25 to 45 lbs., Chgo.	40.00
Relaying rails, standard, Pbgh. and Chicago	$23.00 to 24.00
Relaying rails, light, Chicago	24.00 to 25.00
Angle bars, st. sect., Pbgh. base	2.00c
Angle bars, st. sections, Chgo.	2.00c to 2.50c
Spikes, railroad, Pittsburgh	2.65c to 2.75c
Spikes, railroad, Chicago	2.75c to 2.90c
Track bolts, Pittsburgh	3.25c to 3.50c
Track bolts, Chicago	3.25c to 3.50c
Tie plates, Chicago	50.00 to 55.00

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	2.75c to 3.25c
Structural shapes, Pbgh. (con.)	2.50c to 2.75c
Structural shapes, Philadelphia	2.659c to 3.159c
Structural shapes, Chgo.	2.69c to 3.29c
Structural shapes, New York	2.669c to 3.169c
Tank plates, Chgo.	3.09c to 3.49c
Tank plates, Pittsburgh (con.)	2.75c to 3.00c
Tank plates, Pittsburgh	3.00c to 4.25c
Tank plates, Philadelphia	2.909c to 3.909c
Tank plates, New York	2.919c to 3.919c
Bars, soft steel, Chicago	2.69c to 3.29c
Bars, soft steel, Pbgh. (con.)	2.50c to 2.75c
Bars, soft steel, Pittsburgh	2.75c to 3.25c
Bars, soft steel, New York	2.669c to 3.169c
Bars, soft steel, Philadelphia	2.659c to 3.159c
Hoops, carloads, Pittsburgh	2.75c to 3.00c
Bands, Pittsburgh	2.50c to 2.75c
Shafting, Pbgh., contr. carloads	10 to 20 off
Bar iron, Chgo.	2.35c to 2.50c
Bar iron, Philadelphia	2.559c
Bar iron, Cleveland	2.40c
Bar iron, New York	2.569c
Bar iron, Pittsburgh	2.65c to 2.75c
Hard steel bars, Chgo.	2.50c to 2.75c

SHEETS AND TIN PLATE

BLUE ANNEALED SHEETS PITTSBURGH

	Per lb.
Nos. 3 to 8	2.95c to 3.20c
Nos. 9 to 10	3.10c to 3.35c
Nos. 11 and 12	3.15c to 3.40c
Nos. 13 and 14	3.20c to 3.45c
Nos. 15 and 16	3.30c to 3.55c

BOX ANNEALED SHEETS, COLD ROLLED PITTSBURGH

Nos. 17 to 21	2.70c to 2.85c
Nos. 22 and 24	2.75c to 2.90c
Nos. 25 and 26	2.80c to 2.95c
No. 27	2.85c to 3.00c
No. 28	2.90c to 3.05c
No. 29	2.95c to 3.10c
No. 30	3.10c to 3.25c

GALVANIZED SHEETS OF BLACK SHEET GAGE, PITTSBURGH

Nos. 10 and 11	3.85c to 4.10c
No. 12	3.95c to 4.20c
Nos. 13 and 14	3.95c to 4.20c
Nos. 15 and 16	4.05c to 4.30c
Nos. 17 to 21	4.20c to 4.45c
Nos. 22 and 24	4.40c to 4.65c
Nos. 25 and 26	4.55c to 4.80c
No. 27	4.70c to 4.95c
No. 28	4.85c to 5.10c
No. 29	5.00c to 5.25c

No. 28, black, Chicago	3.09c to 3.19c
No. 28, galvanized, Chicago	5.19c
No. 10, blue annealed, Phila.	3.659c to 4.159c
No. 10, blue annealed, Chgo.	3.24c to 3.44c
Tin plate, 100 lb., coke base	$5.50

IRON AND STEEL PIPE

(Prices Adopted April 21, 1916.)

Steel.

Butt weld:—	Black.	Galv.
⅛, ¼ and ⅜ in.	63	30
½ in.	67	40
¾ to 3 in.	70	50
Lap weld:—		
2 in.	65	40
2½ to 6 in.	68	48
7 to 12 in.	65	44½
13 and 14 in.	53½	..
15 in.	51	..

Iron.

Butt weld:—	Black.	Galv.
⅛ and ¼ in.	52	19
⅜ in.	53	20
½ in.	57	33
¾ to 1½ in.	60	38
Lap weld:—		
1¼ in.	48	26
1½ in.	54	33
2 in.	55	34
2½ to 4 in.	57	37
4½ to 6 in.	57	37
7 to 12 in.	56	36

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	56
Iron, 3½ to 4½ inches, l. c. l.	44

WIRE PRODUCTS

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$2.50 to 2.70
Plain wire, jobbers', Pittsburgh	2.45
Galvanized wire, jobbers', Pbgh.	3.15
Polished staples, Pbgh.	2.65
Galvanized staples, Pbgh.	3.35
Barb wire, painted, jobbers', Pbgh.	2.65
Barb wire, galv., jobbers', Pbgh.	3.35

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled thread, 50 and 10, cut threads, 50, larger or longer, 40.

Machine bolts with hot pressed nuts, ⅜ x 4 inches, smaller or short, rolled 50, 10 and 5; cut, 50 and 5; larger or longer, 40 and 10.

Cold pressed, semi-finished hexagon nuts, 60 and 10.

Gimlet and cone point lag bolts, 50 and 10. Hot pressed square, blank or tapped nuts, $2.90 off list; hot pressed hexagon blank or tapped, $2.90.

Cold pressed square, blank or tapped, $2.60 off; hexagon, blank or tapped, all sizes, $3.00.

RIVETS

Structural rivets, Pbgh	4.25c
Structural rivets, Chgo. delivery	3.50c
Boiler rivets, Pbgh	4.35c
Boiler rivets, Chgo. delivery	3.60c

STEEL SHEET PILING

(Pittsburgh)

Base sizes	2.50c

STANDARD STEEL CHAIN

Chain, ⅜ inch proof coil	5.00c to 5.50c

COLD ROLLED STRIP STEEL

Base price 6.00c to 6.50c per 100 pounds, hard, coils 1½ inches and wider and by .100 inches and heavier.

Extra for Thickness.

0.100-inch and thicker	Base
0.050 to 0.099	$0.05
0.036 to 0.049	0.20
0.035	0.20
0.031 to 0.034	0.35
0.026 to 0.030	0.45
0.020 to 0.024	0.55
0.025	0.45
0.017 to 0.019	1.35
0.015 to 0.016	1.75
0.013 to 0.014	2.45
0.012	2.80
0.011	3.15
0.010	3.50

Other extras as per card of March 15, 1916.

CAST IRON WATER PIPE

Four-inch, Chicago	$33.50 to 34.00
Six-inch and larger, Chicago	30.50 to 31.00
Six-inch Class B, New York	30.50
Four-inch Class B New York	33.50
Four to six-inch Birmingham	28.00
Six-inch and larger Birmingham	25.00

Light weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.10c
Steel squares, 2-in. & ov., Cleve.	3.75c
Steel rounds, 2-in. & ov., Cleve.	3.75c
Steel bars, under 2 in., Cleveland	3.25c
Steel bars, Detroit	3.25c
Steel bars, Philadelphia	3.25c to 4.10c
Steel bars, New York	3.25c to 3.50c
Steel bars, St. Louis	3.15c
Steel bars, Cincinnati	3.20c to 3.75c
Steel bars, St. Paul	3.20c
Steel bars, over 2-in., Buffalo	4.20c
Steel bars, Buffalo	3.35c
Iron bars, Chicago	3.10c
Iron bars, Cleveland	3.20c
Iron bars, Detroit	3.25c
Iron bars, St. Louis	2.75c
Iron bars, Cincinnati	3.20c to 3.75c
Iron bars, Philadelphia	3.00c to 3.25c
Iron bars, New York	3.25c
Shapes, Chgo.	3.10c
Shapes, Detroit	3.25c
Shapes, St. Louis	3.15c
Shapes, St. Paul	3.20c
Shapes, New York	3.25c to 3.50c
Shapes, Cleveland	3.25c
Shapes, Philadelphia	3.25c to 3.50c
Shapes, Buffalo	3.35c
Shapes and plates, Cincinnati	3.20c to 3.50c
Plates, Chgo.	3.50c
Plates, Detroit	4.00c
Plates, St. Louis	3.55c
Plates, St. Paul	3.60c
Plates, New York	4.25c to 4.50c
Plates, Cleveland	3.65c
Plates, Philadelphia	4.00c to 4.25c
No. 10 blue anl. sheets, Chgo.	3.40c
No. 10 blue anl. sheets, Cleve.	3.50c
No. 10 blue anl. sheets, Buffalo	3.25c
No. 10 blue anl. sheets, St. L.	3.45c
No. 10 blue anl. sheets, Cinci.	3.50c
No. 10 blue anl. sheets, St. Paul	3.50c
No. 10 blue and sheets, Detroit	4.00c
No. 28 black sheets, Chgo.	3.20c
No. 28 black sheets, Cleveland	2.95c
No. 28 black sheets, Cinci.	3.95c
No. 28 black sheets, Detroit	3.50c
No. 28 black sheets, St. Louis	3.20c
No. 28 black sheets, St. Paul	3.35c
No. 28 galv. sheets, Chgo.	5.25c to 5.50c
No. 28 galv. sheets, Cleveland	5.25c
No. 28 galv. sheets, Cincinnati	5.65c
No. 28 galv. sheets, Detroit	5.50c
No. 28 galv. sheets, St. Louis	5.25c to 5.50c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$18.50 to 19.00
Angle bars, steel, St. Louis	13.25 to 13.75
Arch bars and transoms, Chgo.	19.50 to 20.00
Arch bars and transoms, St. L.	19.00 to 20.00
Boiler plate, cut, No. 1, Chgo.	11.25 to 11.75
Boiler plate, cut, No. 1, St. L.	8.50 to 9.00
Boiler punchings, Chicago	14.00 to 14.50
Bundled sheet, Cincinnati	8.25 to 8.75
Busheling, No. 1, Chicago	12.25 to 12.75
Busheling, No. 1, Cincinnati	10.25 to 10.75
Busheling, No. 1, Cleveland	13.25 to 13.50
Busheling, No. 1, St. Louis	12.00 to 12.50
Busheling, No. 2, Chicago	8.75 to 9.25
Cast borings, Chicago	6.25 to 6.75
Cast borings, Cincinnati	7.00 to 7.50
Cast borings, Cleveland	7.00 to 7.25
Cast borings, St. Louis	6.00 to 6.50
Cast, No. 1, Chicago	12.75 to 13.25
Cast, No. 1, Cincinnati	11.25 to 11.75
Cast, No. 1, Cleveland	13.50 to 14.00
Cast, No. 1, St. Louis	12.75 to 13.25

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—

New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15 4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Minneapolis and St. Paul	32.9 cents
Denver	68.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	14.00 to 14.50
Iron axles, St. Louis	23.50 to 24.00
Knuckles, coup., Chicago	15.50 to 16.00
Knuckles, coup., St. Louis	14.00 to 14.50
Locomotive tires, Chicago	20.00 to 20.50
Locomotive tires, St. Louis	19.50 to 20.00
Machine shop turnings, Chgo.	5.75 to 6.25
Machine shop turnings, Cleve.	7.00 to 7.25
Machine shop turnings, Cinci.	6.25 to 6.75
Machine shop turnings, St. L.	6.50 to 7.00
Malleable agricultural, Chgo.	12.00 to 12.50
Malleable agricultural, St. Louis	11.25 to 11.50
Malleable, Cincinnati	8.25 to 8.75
Malleable railroad, Chicago	13.25 to 13.50
Malleable railroad, St. Louis	12.00 to 12.25
Pipes and flues, Cleveland	11.50 to 11.75
Pipes and flues, Chicago	11.25 to 11.75
Pipes and flues, St. Louis	11.00 to 11.50
Railroad wrought, No. 1, Chgo.	15.25 to 15.75
Railroad wrought, No. 1, Cleve.	16.50 to 17.00
Railroad wrought, No. 1, St. L.	15.25 to 15.75
Railroad wrought, No. 1, Cinci.	13.00 to 13.50
Railroad wrought, No. 2, Chgo.	14.25 to 14.75
Railroad wrought, No. 2, St. L.	14.50 to 15.00
Shafting, St. Louis	$16.75 to 17.25
Springs, St. Louis	15.00 to 15.50
Springs, Chicago	16.50 to 17.00
Steel car axles, St. Louis	25.00 to 25.50
Steel car axles, Chicago	25.50 to 26.00
Stove plate, Chicago	11.25 to 11.75
Stove plate, Cleveland	11.00 to 11.25
Stove plate, Buffalo	11.50 to 12.00
Stove plate, Cincinnati	8.50 to 9.00
Stove plate, St. Louis	9.00 to 9.50

(Gross tons.)

Busheling, No. 1, Buffalo	$15.00 to 15.50
Busheling, No. 1, Pittsburgh	14.00 to 14.50
Busheling, No. 2, Buffalo	11.50
Bundled sheets, Pittsburgh	13.25 to 13.50
Bundled sheets, Cleveland	12.75 to 13.00
Bundled sheets, Buffalo	12.50 to 13.00
Car wheels (iron), Pittsburgh	14.50 to 15.00
Car wheels (steel), Pittsburgh	18.25 to 18.50
Car wheels, Chicago	12.50 to 13.00
Car wheels, eastern Pa.	16.50 to 17.00
Car wheels, Buffalo	14.00 to 14.50
Car wheels, N. Y.	14.75 to 15.25
Car wheels, St. Louis	12.00 to 12.50
Car wheels, Birmingham	12.50 to 13.00
Tram car wheels, B'ham	10.50 to 11.00
Cast borings, New York	8.00 to 8.50
Cast borings, eastern Pa.	10.25 to 10.75
Cast borings, Buffalo	9.25 to 9.75
Cast borings, Pittsburgh	10.00 to 10.25
Cast, No. 1, eastern Pa.	16.50 to 17.00
Cast, No. 1, Pittsburgh	16.00 to 16.50
Cast, No. 1, Birmingham	11.00 to 11.50
Cast, heavy No. 1, N. J. points	16.50 to 17.00
Forge, No. 1, eastern Pa.	14.50 to 15.00
Frogs, switches, guards, St. L.	15.00 to 15.50
Grate bars, Buffalo	12.00 to 12.50
Grate bars, N. J. points	13.50 to 13.75
Heavy axle turnings, Buffalo	12.00
Heavy melting steel, Pbgh.	16.50 to 17.00
Heavy melting steel, Buffalo	17.00
Heavy melting steel, Chicago	15.75 to 16.25
Heavy melting steel, Cleveland	15.50 to 15.75
Heavy melting steel, Cincinnati	13.50 to 14.00
Heavy melting steel, eastern Pa.	16.00 to 16.50
Heavy melting steel, New York	14.50 to 15.00
Heavy melting steel, St. L.	15.25 to 15.75
Heavy melting steel, B'ham	10.50 to 11.00
Iron rails, Chgo.	18.50 to 19.00
Iron rails, Buffalo	18.00 to 18.50
Iron rails, Cincinnati	13.75 to 14.25
Iron rails, St. Louis	17.00 to 17.50
Iron rails, Cleveland	18.00 to 19.00
Iron axles, Pittsburgh	26.50 to 27.00
Iron axles, Cincinnati	20.25 to 20.75
Iron axles, eastern Pa.	27.00 to 28.00
Iron axles, Chicago	26.75 to 27.75
Iron axles, Buffalo	24.00 to 24.50
Low phos. steel, Buffalo	20.00 to 20.50
Low phos. steel, Pbgh.	20 00 to 21.50
Low phos. steel, eastern Pa.	23.00 to 23.50
Machine shop turnings, Buffalo	8.00
Mch. shop turnings, New York	7.25 to 7.50
Mch. shop turnings, Pbgh.	10.25
Mch. shop turnings, eastern Pa.	9.00 to 9.50
Malleable railroad, Cleveland	15.50 to 15.75
Malleable railroad, Buffalo	15.50 to 16.00
Malleable railroad, Pittsburgh	14.00 to 14.50
Malleable railroad, eastern Pa.	14.50 to 15.00
R. R. and mch. cast, No. 1 Bf.	16.00 to 16.50
R. R. wrought, No. 1, Buffalo	19.00 to 19.50
R. R. wrgt., No. 1, eastern Pa.	21.50 to 22.00
R. R. wrgt., No. 1, New York	20.50 to 21.00
R. R. wrought, No. 1, Pbgh.	18.00
R. R. wrought No. 1, B'ham	14.50 to 15.00
Reroll. rails, 5 ft. & ov., Pbgh.	17.50
Reroll. rails, 5 ft. & ov., Chgo.	16.50 to 17.00
Reroll. rails, 5 ft. & ov., Cleve.	15.50 to 15.75
Reroll. rails, 5 ft. & ov., E. Pa.	18.00 to 19.00
Reroll. rails, 5 ft. & ov., St. L.	16.75 to 17.25
Reroll. rails, 5 ft. & ov., B'ham	14.00 to 14.50
Shafting, New York	19 00 to 20.00
Shafting, eastern Pa.	20.00 to 21.00
Shoveling steel, Chicago	14.75 to 15.00
Shoveling steel, St. Louis	13.00 to 13.50
Steel rails, short, Chicago	17.00 to 17.50
Steel rails, short, Cleveland	18.50 to 19.00
Steel rails, old, B'ham	11.50 to 12.00
Steel rails, short, St. Louis	15.25 to 15.75
Steel car axles, Birmingham	21.00 to 22.00
Steel car axles, New York	22.00 to 23.00
Steel car axles, Buffalo	24.00 to 24.50
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